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ABSTRACT

The capacity of agriculture to act as a familiar vehicle for development of young rural learners' literacy, numeracy, and other necessary life skills was examined through a literature review and case studies of the use of primary school agriculture (PSA) as a contextualizing subject in the following countries: Tanzania, Kenya, Uganda, Cameroon, Jordan, Papua New Guinea, Sri Lanka, India, Colombia, Brazil, Malaysia, and the United Kingdom (UK). It was concluded that integrating agriculture into basic academic/life skills curricula can enhance learning by providing a unifying theme familiar to most rural children and can also improve school-community relations, thereby increasing the likelihood of parents sending their children to school. The following elements were deemed crucial to successful implementation of integrated curricula: adequately trained teachers; motivated teachers; books/materials relevant to local needs; access to relevant resources; support by local community/parents and community/parent participation in program development; sustained government support; and examinations tailored to curriculum requirements. Appendixes contain the following: overview of PSA; case study; sample text book materials for academic subjects that draw upon agricultural practices/experiences; and sample worksheet materials generated during the PSA case study from the UK. Contains 10 figures and 83 references. (MN)

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Contextualising the Curriculum
in Rural Primary Schools: The
Role of Agriculture

Research Report to the Overseas Development Administration

Peter Taylor

Agricultural Extension and Rural Development Department
The University of Reading

November, 1995

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Introduction

There has long been a debate about the content and function of primary education programmes in rural areas. Coombes (1985) suggested that the "minimum essential learning needs" for children growing up in rural areas should include: positive attitudes, functional literacy and numeracy, a scientific outlook, and functional knowledge and skills for raising a family and operating a household, for earning a living, and for civic participation. It would seem, however, that basic education programmes do not serve the needs of many of the young people who pass through them. In many countries, drop out rates, repetition and urban drift remain high, and rural unemployment continues to rise.

The reasons for these problems are various. They may be caused by inadequate resources (financial, human and material). Poor quality of education is often a major contributing factor; a need for more effective teacher training is frequently cited, for example. The content and scope of many educational programmes have also been criticised; in order to meet the essential learning needs listed above, it becomes clear that the content of education programmes, the methods by which learning is facilitated, and the materials used to this end must all be pertinent to the experience and culture of the learners (Graham-Brown, 1991).

This creates difficulties, however, since the experience and culture of rural dwellers will vary from one locality to the next. The needs of individuals also differ markedly, since some learners have been educationally disadvantaged for social, economic and/or political reasons. Other individuals have greater difficulty in engaging in intellectual activities, perhaps because of special educational needs. Development of "relevant" primary schooling on a national scale will be rendered almost impossible, therefore, unless some unifying theme is identified which can provide a direct link to the experience of the learners, and can also be readily adapted to fit each local situation.

Agriculture is a subject area which may fit this purpose, but although it may be seen to be valuable as an integral element of primary schooling and providing support for a wide range of learners, there are numerous difficulties which must be overcome in its provision. There is a case, therefore, for examining the potential of agriculture in rural primary school curricula. This requires an analysis of the capacity for agriculture to "nurture" learners in terms of its existing provision, and the implications of this for the way in which it may be provided in the future.

In particular this study examines from a conceptual point of view, and through the use of case studies, the capacity of agriculture to act as a familiar vehicle for the development of young rural learners' basic skills of literacy, numeracy, and other life skills which are perceived as necessary for a

fruitful and productive life. At the same time it highlights the problems which may arise in attempting to use agriculture in a way which may challenge its traditional role as a vocational subject area.

The study reviews literature which examines the concept of integrating subject areas into the curriculum which have a direct relationship with the experience of the learners. In particular, case studies are reviewed which relate to the inclusion of Agriculture as an integrated "cross-curricular" subject area in rural primary education programmes throughout the developing world. This takes into account the benefits accrued and the problems faced by learners and by those involved in the development of education programmes, as well as the constraints which may reduce the likelihood of beneficial outcomes. Evidence derived from relevant experience in countries in the United Kingdom have also been considered where appropriate.

1. Primary School Education in Developing Countries - an Overview

1.1 The Context

Much has been written about the condition of primary education in developing countries, and, in particular, rural primary schools (Colclough and Lewin, 1993, Levin and Lockheed, 1993). This paper suggests only one approach by which primary education may be enhanced, but it will be stressed that this approach is insufficient on its own to solve many of the problems facing primary schooling. In order to examine one area, therefore, it is necessary to explore the relationship between a wide range of factors which constrain primary school effectiveness. This section will provide, a brief overview of perceived benefits of primary education, note some recent trends in primary education provision, and discuss some of the key constraints on primary school effectiveness which have a bearing on the particular focus of this paper.

1.2 Benefits of Primary Schooling

The benefits of primary education are manifold; the primary school's broadest responsibility is to shape and strengthen the child as an individual in relation to his or her fellow men, to nature, and to the world as an environment (UNESCO, 1971). Individuals should be enabled to develop a capacity for life-long learning. In turn, it is expected that these individuals will develop knowledge, skills and attitudes which will contribute to the general development of the community in which they live by meeting community manpower needs and by being involved in activities which aim to improve community life (Barnard, 1982), and to the development of the nation as a whole.

Apart from these broad, developmental goals, there is a realisation that primary school education is productive in a strictly economic sense. Social returns to primary education appear to be higher than those at higher levels of education. Private returns are higher than social returns, since the provision of primary education is funded, generally, by the government.

Moreover, the social returns and the productivity of primary education have been more influential outside the formal sector of the economy; this has caused even greater interest towards it. There is growing evidence that primary schooling which results in literacy and numeracy enhances productivity in both rural and urban self-employment. Taking agriculture as an example, primary education may enhance output in three ways:

- ♦ increasing the effectiveness of the individual worker, increasing output with given inputs, by using basic skills of numeracy and literacy

- ♦ more effective input allocation
- ♦ more effective input selection

Lockheed et al (1980) showed that 4 years of schooling can increase agricultural output by 8%, a higher impact than the same years of schooling in a "modernizing" environment. Health, life expectancy, rates of population of growth, and leisure are all areas which benefit from primary education. Moreover, cognitive and non-cognitive changes occur more rapidly among younger children (8 years old and less), thus emphasising the need to provide primary education for the 5-7 age group. (Many countries are now extending the provision of nursery or "pre-school" education, but in many cases this is not feasible).

Colclough and Lewin (1993) qualify the benefits of primary school education by pointing out that other factors will affect the development of individual children, regardless of the type of primary education they receive. Inequalities imposed on children by their home, neighbourhood, and peer groups are carried along to become the inequalities with which they confront life at the end of the school. Studies in the United States have shown that the type of school, the teachers' qualifications and the availability of teaching materials are much less important than parental education, the father's occupation, the number of books in the home and family size on the achievement of children at school. This may only be the case in a well-resourced situation, however, where diminishing returns might be occurring regarding the resource inputs in schools. Heyneman and Loxley (1983) found that school effects are indeed significant determinants of achievement in a sample of countries which included 16 developing and 13 industrialised ones. Results suggest that the lower the per capita income of the country and the weaker the influence of socio-economic background, the greater the effects of school and teacher quality will be on student achievement (Fuller, 1987).

Another important issue to consider regarding primary education is that for many children, it will be the only formal education which they will receive (Elstgeest, 1987). Baker (1989) noted the example of the Tanzanian primary school programme which is "complete in itself inculcating a sense of commitment to the total community to help the pupils to accept the values appropriate to Tanzania". Other objectives relate to the achievement of literacy, numeracy, the development of an inquiring mind, and the imparting of "socialist values attitudes and knowledge". Perhaps the political inclination may vary from country to country, but the other objectives are commonly found in National Development Plans the world over. In fact, the official primary education curriculum is remarkably similar worldwide; overall, 35% of available time is spent on literacy and 18% is spent on numeracy.

1.3 Trends in Primary Education Provision

In acknowledgement of these benefits, the Governments of almost every country in the world have set themselves the target of achieving Universal Primary Education, so that every child between the ages of 6 and 11 will be provided with a public education. Lockheed and Levin (1993) note that this goal seems a long way off, however. 90% of the nearly three million primary schools in the world are in low- and middle-income developing countries; in these schools some 480 million children struggle to learn. Only about one half of all school-age children in developing countries acquire a complete primary education, with nearly half of those who are enrolled dropping out before the end of the primary school cycle in low-income developing countries. This is supported by UNESCO data from 1985, which claims that less than 65% of primary age children in low-income developing countries (apart from India and China) had places in school. Of these children, many were repeaters, thus causing the actual rate of participation of children in primary school to be less than 50%, and leaving an estimated 145 million children out of school. Even those who complete primary education, appear to lack the capacity to apply their knowledge to unfamiliar problems. Schools in these areas are poorly funded and the allocation and management of resources becomes a constraining factor.

This problem of low levels of participation is not new. An attempt was made to address it during the mid-70s, when a new trend had emerged favouring Basic Education as a parallel system to primary schooling (Colclough and Lewin, 1993). The idea was to concentrate on those aspects of primary education which would lead to the formation of economically useful skills such as literacy and numeracy and add others which might support productive self-employment in primarily rural communities. However, since this scheme did not seem to meet the aspirations of the parents, and it seemed to legitimise existing inequalities, the idea largely faded away.

Looking at financial trends, the World Bank, as the major donor for education, stepped up its lending commitments to primary education to one-quarter of all educational lending during the early 1980s, but only 4.3% of all international aid flows for education (40 cents per child in school) was directed at primary education; of this, less than 35% covered recurrent expenditures. A review of education sector lending over the Financial Years 1984-88 found that the largest proportion (34%) of policy measures to improve primary education addressed issues of effectiveness; half of these focused on improving teaching (primarily through in-service training) and providing instructional materials (primarily textbooks). Education funders still struggle to estimate the returns for any of these investments, however; educational cost-benefit analysis is notoriously difficult to estimate and equally controversial (Hough, 1991).

About half, probably, of the countries with low Gross Enrolment Ratios seem to have low commitment to the provision of schooling, since it is thought that UPE can be achieved with amounts less than 2% of GNP (eg. Nigeria, Pakistan, Bangladesh, Nepal, Bolivia). Colclough and Lewin suggest that where investment in UPE is between 3 and 7% of GNP, cost-reduction strategies may be needed, for example by encouraging community participation and integration. Evidence shows, however, that poor rural people are not always able to provide a substantial number of resources, and can meet neither the direct nor the indirect costs of education. Hence, in countries where parents have been expected to pay for primary education for their children (e.g. Malawi), many children in rural areas have been unable to attend school. In countries suffering from severe recession, or in regions where incomes are generally low, reducing the private cost of education could be expected to increase demand for schooling.

There are examples of countries (Zimbabwe, Sri Lanka, Ghana, Columbia) where major reforms were introduced in an attempt to increase provision of primary education in rural areas. These included curriculum reform, decentralisation of examinations, transfer of responsibility for some funding to community members, and changing concept of the teacher's role towards being a facilitator and even an entrepreneur. These changes may have served only to increase the gap between the effectiveness of rural primary schools and those in urban areas, however.

1.4 Constraints on Primary Education Provision

Lockheed and Levin (1993) have provided a useful "shortlist" of three groups of factors which appear to contribute to a primary school performing effectively. Turning the case around, the absence of some of all of these factors could result in the performance of a school being ineffective. Critical constraints which pose serious performance problems for primary schools appear to be as follows:

- i) Inadequate necessary inputs
 - ♦ curriculum is frequently poor in scope and sequence, and in the way in which it relates to the students' environment;
 - ♦ instructional materials are in short supply; availability does not guarantee that they will be used, since textbook quality is often poor and/or too difficult for the age-group at which they are aimed (Recent research of curricular scope and sequence in mathematics and reading textbooks in 15 developing countries found that the material in both subjects was too difficult at the earlier grades. In the upper grades, the mathematics curriculum was too difficult, but the reading curriculum was too easy and failed to develop problem solving skills appropriately);

- ♦ time for learning is inadequate, because of very high pupil teacher ratios, extra-curricular demands such as caring for pupils basic needs, and the pull of home commitments;
 - ♦ teaching practices encourage rote learning rather than understanding; teachers are frequently inadequately trained, if at all.
- ii) Lack of facilitating conditions
- ♦ community-school relationships are often poor;
 - ♦ parental involvement and support is limited, non-existent, or at worst, hostile;
 - ♦ school-based professionalism is underdeveloped, in terms of principal leadership, teacher collegiality, commitment and accountability;
 - ♦ flexibility in curricula (e.g. encouraging relevance, level and pace to meet local conditions), in organisation and pedagogical approaches is lacking.
- iii) Absence of the will to act
- ♦ "vision" is lacking;
 - ♦ decision making is centralised.

Although all schools may suffer from constraints such as these, the problems faced by primary schools in rural areas are often greatly exacerbated, for a number of reasons.

1.5 Constraints on Rural Primary Schools

In rural areas, parental income levels are often low, and so financial contributions from non-government sources may be negligible. Children are frequently expected to assist with production-related tasks, and so are not allowed to attend school. Timing of the school day and of terms is often designed to fit more with an urban, industrialised system, expecting children to attend school during busy periods in the agricultural year. Parents in rural areas are likely to have received less formal education than their urban counterparts and may attach a lower value to schooling. Homes, and indeed schools, in rural areas are often ill-equipped to meet the needs of children to study, for example with an absence of electricity. Children may come to school undernourished and in poor health, placing a greater stress on a single teacher who may have to deal with fifty-plus children ranging from four to fourteen in one room, lacking the most basic facilities and resources (books, visual aids, etc.).

Curriculum design (when available) is usually centralised and rigid, often revealing an urban bias and middle-class, westernised values (Bennet, 1993), with no opportunity to relate learning to the situation from which rural children come. Children are not stimulated to learn, and rarely engage actively with the learning material. The learning material itself may be based on examples and situations which children in rural areas never come into contact with.

Teachers in some rural schools are themselves from urban areas, and have little or no understanding of the background of their pupils; they may well be posted to a rural area under sufferance, could travel some distance to school, and have no commitment to their work. As a result of demotivation, the curriculum implemented may vary markedly from the original, time available for learning is reduced, and pedagogical practices leave much to be desired.

In summary, the main problems facing rural primary schools could be listed as follows:

- ♦ low family incomes
- ♦ lack of infrastructure (electricity, water, all-weather roads etc.)
- ♦ low expectations of education from parents and pupils alike
- ♦ demands on children to provide family labour
- ♦ underfunding of educational provision, compared with urban areas
- ♦ unsuitable timing of school activities
- ♦ urban-biased curriculum, irrelevant to the experience of rural dwellers, using urban-oriented materials and text books, and inappropriate to the level of the learners
- ♦ teachers of urban origin, who take a rural posting under sufferance (and may commute from a town, when the roads are open)
- ♦ classes of large size and of mixed age groups
- ♦ schooling aimed at educational progression, rather than equal emphasis on preparation of pupils for life and work in the rural community.

It is sad, and not surprising then, that rural schools in developing countries suffer even more than their urban counterparts from the major afflictions of low completion rates and under-education of completers. This in turn results, as Lockheed (1993) notes, in an undereducated adult workforce; the rural-urban divide is not merely maintained, but increased.

The particular issue of low completion rates is worth looking at in more detail, as it is one of the most severe problems currently facing primary education provision in developing countries.

1.6 Low Completion Rates

The phenomenon of pupils failing to complete their primary education programme is frequently referred to as "drop-out". According to LeCompte and Dworkin (1991), a "drop-out" is a pupil of any age who leaves school, for any reason other than death, before graduation or completion of a program of studies and without transferring to another elementary or secondary school. Colclough and Hallack (1975) defined drop-outs as those that leave the school at any time other than the

established exit points (at the end of the primary, lower secondary, senior secondary or tertiary cycles). Less than three quarters of a cohort of primary entrants typically survive to grade 5 in 28 of 57 developing countries (Berstecher and Carr-Hill 1990: 110).

LeCompte and Dworkin (1991) highlight a wide range of factors which contribute to "drop-out". They group these into four categories, pupil-related factors, school-related factors, constructed factors and macrosystem factors, as follows:

i) pupil-related factors:

- ♦ familial, socio-cultural factors
 - activities and incentives out of school
 - peer pressure
 - perception of the value of education by pupils, their families and peers
 - income
 - family marital status
 - mother's education
 - parental satisfaction with school and attitudes of parents towards helping their children at home
 - being children of teenagers
 - female pupils as teenage-mothers (early pregnancies)
 - loss of housing, doubling up and crowding
- ♦ age and intellectual/cognitive development
- ♦ gender (girls are most likely to drop-out although they tend to be higher achievers than boys at primary school)
- ♦ poverty
 - can damage self-esteem
 - inadequate housing, noise and crowding means that homework can not be done
 - poor nutrition and insecurity
 - poor health, eg. poor vision, uncorrected
 - children may be forced to work
 - inability to afford uniforms, books, stationary and fees)
- ♦ language proficiency
- ♦ poor social skills
- ♦ low rates of retention
- ♦ tendency to truant (because of any or all of the above factors).

ii) school-related factors:

- ♦ microsystem of schools (relationship between school and local community, general school organisation and practice, prevalence of drugs, violence, abuse, disease in the school)
- ♦ inadequate teaching methods (chalk and talk; failing to concentrate on pupils with difficulties or to stretch those who need to move ahead faster)
- ♦ unresponsive staff and school structure (lack of orientation of schools towards the future)
- ♦ discontinuity of student's culture and that of the school

- ♦ inadequate teaching resources and materials, buildings, overcrowded classrooms
- ♦ irrelevant curricula (emphasis is on certain abstract subjects with little relevance and focus on exams, not practically oriented)
- ♦ stratification of knowledge and information (learning task is fragmented, the ultimate goal is not clear; the learning tasks that structure the curriculum are divided and sub-divided)
- ♦ emphasis is on progression for further education, not for development of social and economic skills and awareness
- ♦ ability grouping of pupils is not always effective
- ♦ high rates of repetition and drop-out (becoming the norm).

iii) constructed factors:

- ♦ the attitudes and perceptions of the teachers and the pupils towards the school and each other:
 - pupils dislike school due to boredom/other school-related factors, and find it meaningless
 - teachers dislike/ill treat pupils

iv) macrosystem factors:

- ♦ the social, political, economic contexts in which schools are embedded (demography, labour markets, family structures, etc).

In any particular situation, some or all of the above factors will contribute to the rate of drop-out in primary education. These factors are not weighted equally; there is debate about how important the effect is of each of them; certainly drop-outs are characterised often as being from a background of low income and are low achievers, poor readers, have discipline problems, and are frequent truants. A combination of several of the factors listed above is likely to be behind increased rates of dropout, however.

Taking an actual example, a study of rural primary education in Brazil (Harbison and Hanushek, 1992) revealed a number of interesting aspects related to the drop-out rate. If the father is a farmer, for example, there is a high opportunity cost for children going to school, and since children are needed to labour on the farm, there is a higher incidence of drop-out in rural areas. Another determinant of drop-out is the age of the child. The older the child, the greater the potential labour contribution, and the more likely it is for the child to drop-out; this means that the higher the grade, the higher the rate of drop-out. Another determinant is the education of the mother. Conversely, if a mother was well educated, she would like her children to continue their education. It was also observed that girls were most likely to continue their education, since there was a lower opportunity cost for them attending school. Achievement at school was another determinant. The school performance and the learning

achieved, via the curriculum, would determine the promotion probabilities, thus the repetition rate, and as a consequence the drop-out rate. The characteristics of the school were also likely to influence the drop-out rate. If there were not enough facilities provided, the drop-out rate was likely to increase. Migration would also influence the drop-out rate, and in turn, migration was influenced by the cost of moving. Available work opportunities would also determine the drop-out rate.

In another case, a study of village primary education in Pakistan (Pakistan Ministry of Education, 1977) showed that the reasons for the boys' and girls' drop-out had much in common, with poverty heading the list. In the case of girls, social and religious reasons were also cited. Data showed that drop-outs rated lower in health, intelligence, peer relations, social class/caste, self-concept, work attitudes. Also seen as influential were parental attitudes towards education, relationship between pupils and family, and familial income and stability. Where these were problematic, pupils rated much lower on school success factors, and on basic skills and knowledge, particularly in literacy and numeracy.

A third example is from my own recent experience in India, when I visited a village primary school in an area where the drop-out rate is currently at 72%. This school had the following characteristics:

- no financial support from government
- a single room without electric light or water
- 55 children aged 4 to 14 in the room
- the youngest children requiring medical treatment, feeding, clothing and washing from the same teacher
- textbooks without illustrations, with close print and set at a level far too advanced for the pupils educational level
- pupils writing with chalk and slate (both in short supply)
- no visual aids
- one untrained teacher who, when asked what her main problems were, said that there were so many it was impossible to begin to explain them.

These examples highlight only the main factors which appear to affect drop-out; no doubt many more of the factors listed earlier were also contributory. The examples serve to illustrate the complexities behind the statistics, however, and emphasise the fact that there is rarely one particular factor which causes drop-out. Simple "quick-fix" solutions evidently will not be the answer to this enduring problem.

It is important to note that some of the most serious problems in the examples given above emanate not from the school, its staff, organisation, or curriculum but arise as a result of the "pupil-related" and "macrosystem" factors. This indicates that restructuring educational or school policy will never be

sufficient alone in addressing the drop-out problem.

Drop-out still arises even when children attend school regularly, however. Before considering possible solutions, therefore, we should refer back, briefly, to the second problem mentioned at the end of section 1.5, the under-education of primary school completers.

1.7 Under-education of Primary School Leavers

Many of the pupils who succeed in completing primary education but do not continue on to secondary education (perhaps because of a shortage of places, unaffordable school fees, distance away from the school, etc.) appear to have acquired little in the way of knowledge, skills and attitudes which they are able to draw on and apply in their post-school lives for their own benefit or for the benefits of their communities and nation. Many of them have low levels of literacy and numeracy, even though these are seen as the chief outcomes expected of primary school education. Equally, children who do progress to secondary school often have difficulty coping with the level of studies expected of them there, particularly where the curriculum demands understanding of concepts, rather than rote-memorisation. This "under-education" serves to compound the poor impression of primary schools amongst pupils and parents, and even prospective employers and providers of credit. In turn, this can accentuate the likelihood of drop-out.

Just as the problems which lead to drop-out are many and complex, so will be the root causes of the under-education of any particular pupil. Indeed, many of the factors which contribute to high drop-out rates will also lead to general under-achievement of pupils. In terms of individual pupils, it is of course difficult to know whether any child has reached their full intellectual potential at a particular age, regardless of the situation in which they undergo their schooling. The fact of the matter is, however, that the goals of primary schooling described at the beginning of this section appear not to have been achieved in the majority of developing countries.

1.8 Solutions

A number of solutions have been tried in an attempt to overcome the problems and constraints noted in the previous sections. Some of these have been quite specific, such as training teachers, reforming the curriculum, providing resources and so on. Lockheed and Vespoor (1990) note that improvement of instructional materials, more effective teaching and increased time for learning has been valuable. Attempts have been made by different countries to tinker with the length of the academic year; in some it has been substantially shorter (e.g. Ghana, 610 hours) and in others,

it has been made longer (eg. Morocco, 1,070 hours) (it should be remembered, however, that actual instructional time is much less than "official" instructional time in most developing countries). Flexible scheduling of school hours has been introduced to reduce student absences by accommodating rural children's work schedules. Improvements in the English language proficiency of teachers seems to have had an effect on their students' achievement in both language and mathematics where English is the medium of instruction (e.g. in Uganda).

Curriculum reform has been an important feature in many countries. Some 60% of World Bank-financed primary education projects over 1970-83 included a curriculum reform component. In Zimbabwe examinations were localised and the number of subjects and topics in the curriculum were rationalised. Innovative approaches to develop an integrated curriculum design have been introduced in countries as diverse as Sri Lanka, Malaysia, Papua New Guinea and Brazil. In Colombia, "Escuela Nueva" developed an integrated, flexible curriculum for early primary grades, which increased achievement and lowered repetition of rural children significantly. Emphasis was placed on the ability to apply knowledge within the community, on school-community links and the use of local materials for teaching purposes.

Most reforms have been piecemeal in nature; there is also the belief that a much broader integrated approach should be adopted; this reflects the view of the "effective schools" movement, where lists of characteristics of effective schools have been used as "blueprints" by which other schools could be developed. In addition, the need for improvement of socio-economic conditions and infrastructures, particularly in rural areas, will be inevitable. It may be seen as necessary to reform the entire primary school sector of a region or country.

Referring back to the example of the Indian primary school above, it was heartening to see that, here too, attempts were being made to improve the situation. Funding was being raised by community members to pay for the school building and the salary of the teacher. Local artisans had made the desks and benches themselves. The teacher was prepared to continue working under the most extreme circumstances for a miniscule salary, rather than moving to the town to seek more lucrative employment, and was attempting to develop her teaching techniques. The curriculum had been overhauled recently by the local state government in order to increase local relevance. Guidance was being provided for teachers on teaching methods and pupil activities appropriate to the various topics; there were examples given in the curriculum which had relevance to a rural setting (although few); the importance of the local language was emphasised and encouraged as the medium of instruction. Even amongst the most difficult circumstances, improvements were being made.

On this rather optimistic note, I will suggest another possible means by which effectiveness in rural primary schools could be enhanced. This approach can not overcome all the constraints mentioned above, and it is important to note Lewin's (1993) comment that an analysis such as this "can do no more than point the way towards worthwhile possibilities that need exploration and validation at the intra country level" (p.32). It will, hopefully, provide food for thought about the way in which primary schools, teachers and education authorities could bridge the gap between the groups of problems listed above, not merely by trying to change what may be insurmountable obstacles, but rather by building on the opportunities which are presented by rural primary schools and the environment in which they are located.

2. Contextualising Learning in Rural Primary Schools

2.1 Problems to be addressed

In Section One I described the wide range of problems which beset the rural primary education sector. This is not to suggest that urban schools are without difficulties (they certainly have more than enough to cope with), but because I will present a proposal in this paper for a process of curriculum reform which would have implications for rural primary education specifically; that is to develop a role for agriculture as a means of contextualising learning. The nature of a curriculum developed for rural schools is a subject of much debate, however. It is often stated that the curriculum should suit the needs of rural children, but at the same time there is confusion over what their needs really are, as they appear to face problems far greater than their urban counterparts in gaining access and making the most of what is likely to be the only formal educational opportunity they will have. Many of these problems are social, however. The "pupil-related" and "macrosystem" factors discussed in section 1.6 cannot be addressed easily through educational reform, but require action by a wide range of stakeholders, including the government, local communities, and, perhaps, schools under certain conditions.

Although these social problems are difficult to resolve, schools presumably can do something about educational problems. They do not hold the key to all educational solutions of course, since government will need to provide complementary support by creating enabling policy and by supplying resources, not only material, but through the reform of teacher training, learning materials production and curriculum development. Since a lot of what goes on in rural schools appears to differ quite markedly from what is propounded by policy makers and centralized curriculum developers, however, so schools may well be able to play an increasingly important role in meeting the needs of the children who attend them. One of the most consistently noted problems facing primary schools is that much of the content of the curriculum seems (or indeed is) irrelevant to the lives of rural children. This raises the question, therefore, of what kind of curriculum will meet the requirements of rural primary schools.

2.2 What should be learned?

2.2.1 A curriculum for the "disadvantaged"?

The curriculum of rural primary schools is often termed irrelevant, because there is a perception that a great gap exists between the nature of what is taught in school and the life experience of the learners. It has been suggested that, in this sense, children who live in rural areas of developing

countries are "disadvantaged"¹ in comparison with their urban counterparts.

This is a contentious issue. According to this argument, adverse environmental circumstances may deny children the security and emotional adjustment essential for consistent application to the tasks of learning in the formal primary school situation.

The environment of disadvantaged children may be rich in certain kinds of experience, but it is a reasonable generalization that their horizons may be narrow, and they tend to be restricted in many kinds of experience which are often assumed in school work. Curricular activities which make the most of the immediate environment seem particularly valuable to them... (Gulliford and Widlake, 1975:13)

Disadvantaged children, in these terms, were characterised by a limited background of language and experiences in their home environments, resulting in difficulty in fully comprehending the language and the concepts used by their teachers, in books and in other materials. This lack of "relevant" experience often resulted in pupils not being able to think about abstract ideas. Those who were not very successful were likely to be less eager to learn, and hence a vicious circle was formed.

The term "disadvantaged children" may now be seen as somewhat pejorative, since it could be used to make a broader, unjustifiable inference about the value of a rural environment and culture from which a child originates. Indeed, many rural development practitioners now emphasise the importance and value of rural peoples' knowledge, and the need for rural education and extension programmes to build on it as a foundation. Seshadri (1993) talks of "shedding aside the patronizing attitude towards the disadvantaged", and instead "capitalizing on the strengths of these classes".

The real issue to be addressed, therefore, is not the value of a rural upbringing, but the fact that the aims and processes associated with primary school education seem to be based on an acceptance of a certain range of knowledge, skills and attitudes, the acquisition of which is deemed as valuable and

¹ It is important also to note that within the broad category of "children from rural areas", there will be children also who might individually be termed "disadvantaged", since their particular circumstances are even less conducive to enable them to perform effectively at school than their peers, either because of their immediate social situation, or because they have special educational needs. In many rural areas where the most basic resources are in short supply or absent altogether, their special needs are even less likely to be met.

necessary for citizens of a "modern" society. Knowledge imparted within schools is seen by many as "superior" because it is part of a "superior" culture of civilization (Bacchus, 1982).

Such an issue has fuelled an ideological debate over the content and processes of education for rural children; this in turn has led to the development of several alternative forms of curriculum in primary schools.

2.2.2 An academic, school-based curriculum

Amongst some educationalists there is a belief in the existence of a body of academic knowledge which, although unrelated directly to the life experience of many people, should be learned by all:

...the educational value placed upon abstractness and writeness is a correct one, even though it also has a fetishistic element. It is also correct for schools to specialise in forms of thought which are not easily mastered through the informal culture. The critical thing is whether they present these forms as alternative or complementary to informal culture.
(Chanan, 1976:112)

Cox and Jones (1983) suggested that there is a need to deliver the same basic skills to children the world over, since the ability to abstract and master the written word leads to the acquisition of the tools to exercise power, by mastering knowledge that is outside the scope of personal experience. Their view is that this conforms with what parents want for their children, i.e. the means of their children succeeding in finding well-paid employment. Coombes (1985) suggested that the "minimum essential learning needs" for children growing up in rural areas should include: positive attitudes, functional literacy and numeracy, a scientific outlook, and functional knowledge and skills for raising a family and operating a household, for earning a living, and for civic participation. This view would be supported by many. For example:

The basic literacy and numeracy skills are of greater value than specific technical skills when students are unable to find work immediately after they finish training. Technical skills tend to deteriorate with disuse, and employers prefer literate and numerate recruits who can follow instructions and acquire new short-term skills quickly as new job opportunities arise....Primary and secondary school curricula must focus upon the basic skills of numeracy, literacy and scientific understanding.
(Gray et al, 1992).

Figure 2.1 demonstrates this line of thought diagrammatically:

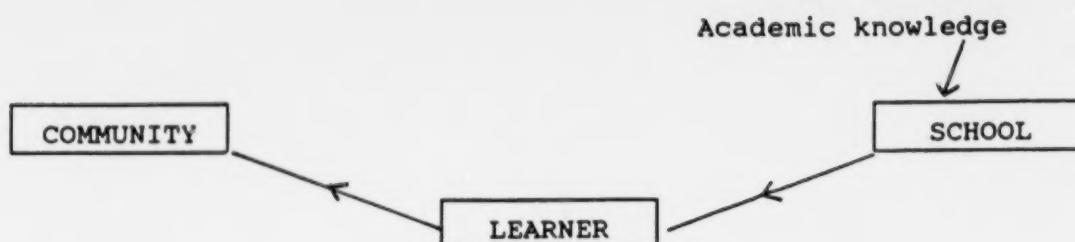


Fig. 2.1 A school-oriented, academic approach to learning

Often associated with this type of approach to learning is a curriculum which is undifferentiated. In this case there would not be any radical difference in curricula experienced by children grouped according to some perceived disadvantage; any difference should be in the methods of presentation and teaching. The argument for this is that differentiation can result in segregation, and thus some sort of social stigma could be attached to the children, besides prematurely (and probably unjustifiably) closing doors to further educational opportunities. This could also accentuate the urban-rural divide which is observed in many developing countries, thus exacerbating an already difficult situation.

Although this approach to primary school curriculum development and teaching is supported widely, an accusation has been levelled against it on the grounds that, in practice, such a curriculum tends to be geared to those children whose experience conforms more closely with a culture identified as "modern" and "superior". What makes matters worse is that the "superiority gap" is becoming accentuated, since the global influence of western media and marketing organisations increasingly interprets as "modern", a middle-class, urban dreamworld, inconsistent with the reality of most rural communities.

In order to address the complaint that the undifferentiated, academic curriculum fails to supply school children with skills directly applicable to the world of work, some countries have developed and implemented a "ruralised", vocationally-oriented, diversified curriculum.

2.2.3 The Ruralised, Diversified Curriculum

Some would argue that, in addition to literacy, numeracy and scientific understanding, it is valuable for children to acquire skills in technical areas which will relate directly to future work opportunities, particularly in agriculture. This has meant in practice that the content and activities included in the ruralised curriculum are related explicitly to the experiences of children brought up in rural areas (figure 2.2).

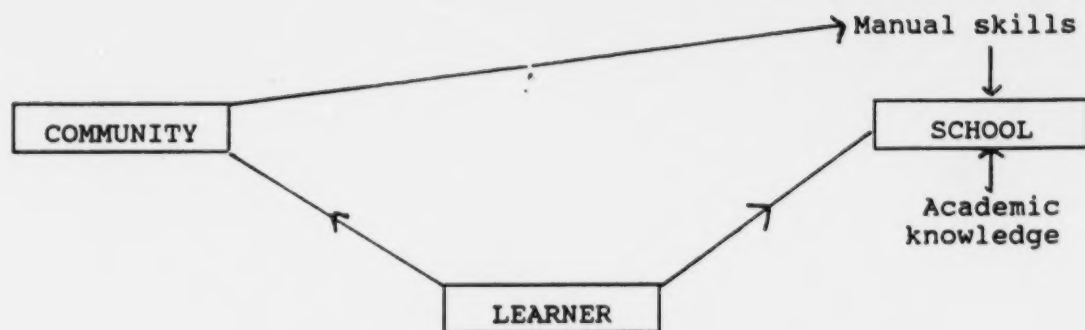


Fig. 2.2 A ruralised, diversified approach to learning.

There is here, typically, some kind of focus on local, rural, social and functional issues, including the learning of basic agricultural skills. In this sense, such a curriculum may be relevant in two major ways, firstly in that the curriculum (broadly speaking) is relevant to the life experiences of the learners, and secondly that the learners acquire knowledge, skills and attitudes which will prepare them for life and work in the community from which they come. Primary education of rural children is thus seen as having a vocational orientation. This type of curriculum may be quite rigid, but with a rural bias.

In some countries, for example Tanzania, Cuba and China, the curriculum for all schools, rural and urban, was ruralised, since agriculture was identified as a key aspect of life and of the economy which everyone should learn about and play a part in. In cases where agriculture has been included as an intrinsic part of the rural schools curriculum, it has been implemented either as a manual activity, added on to the school curriculum (for example Benin, Burundi, Congo, The Gambia, Seychelles, Uganda, Zambia, Columbia, Sri Lanka, to name but few), or as a distinct subject area in the curriculum (for example Botswana, Cote d'Ivoire, Kenya, Lesotho, Malawi, Rwanda, Swaziland and Tanzania).

Primary school agriculture (PSA) frequently forms an important aspect of this type of curriculum, and, indeed, a great deal has been written about it, particularly by Bude, Riedmiller, Mades, Eisemon and Bergman, amongst others. Important as I feel the issue is, I do not intend to provide another review here, since a host of excellent material exists on the subject already. Readers may find, however, that an overview of current thought on PSA would be valuable, and so I include one at Appendix A.

Detractors of the ruralised, diversified curriculum (the World Bank in particular) believe that it leads to the creation of a dual system unwanted by parents and pupils, still failing the

group of children who are most disadvantaged in society. Also, in most countries, a national curriculum is developed centrally; the inclusion of agriculture, for example, in a national curriculum might be to the disadvantage of urban children since it is likely to be outside their life experience.

Another enduring problem is that agriculture and other forms of technical skills training may indeed relate to the life experiences of rural children, but it is well documented that many community members, particularly parents, view primary education as a means of enabling their children to leave agriculture² behind and to go to work in urban areas where they may earn money which can be brought home to the family.

Finally, there is the debate over whether school agriculture actually has any impact on agricultural production in the community. White (1990) argues that acquisition of literacy and numeracy may be more effective than school agriculture in increasing agricultural production levels, and makes the case that school children should learn "about" agriculture, rather than "for" agriculture; the objective should be to promote "agricultural literacy", rather than to produce trained farmers. Eisemon (1989) notes that learning about modern farming techniques in school does not appear to create better farmers once they return to the community, partly because the adoption of innovative farming practices seems to depend more on the level of cognitive development in an individual, and also because much of the technological content of "modern" agriculture bears no relationship to traditional agricultural practices and knowledge.

Instead, the separation of modern agricultural science and technology from indigenous traditions is reinforced in schools not only by the practice of excluding traditional knowledge from instruction, but also by the use of metropolitan languages to teach science and in countries like Kenya, agriculture as well (p.26).

Thus it would seem, as Eisemon suggests, that:

The content of agricultural instruction and its articulation with instruction in modern science is particularly important. Also important is connecting instruction in modern science and modern agriculture to indigenous knowledge systems, building upon the knowledge and skills students possess from social experience (p. 26).

²It should be noted here, that it is difficult to separate the concepts of "agriculture" and "rural life". Agriculture is certainly a major feature of the lives of many rural dwellers, but not of all. It is also important to realise that "farming" is not always seen as an occupation, but as "part of life", the purpose of which is to provide food security for the farmer and his or her family.

The question is, how can this be achieved? One approach has been to attempt to integrate school and community knowledge.

2.2.4 Integrating School and Community knowledge

The examples given so far have emphasised the role of the school in the learning process. An alternative approach has sought not to maintain a school-based body of knowledge, but to attempt the integration of "community" or "rural peoples'" knowledge into the curriculum. This certainly has been one of the aims of the community school movement, yet it has proved a minefield, since an assumption was made, generally, that school and community knowledge systems are compatible. This led to the development of the argument that, since reality is socially constructed, knowledge which represents an interpretation of that reality or is based on direct experience must be specific to the society in which it develops. Consequently, the basis of school knowledge should be community knowledge (figure 2.3).

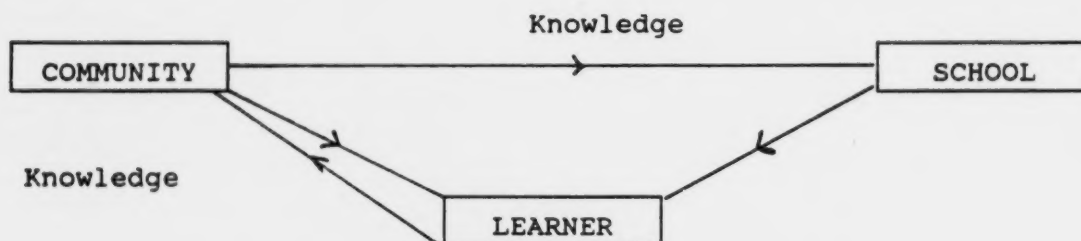


Fig. 2.3 A community-oriented approach to learning

Unfortunately, as Bacchus (1982) pointed out, the integration of school and community knowledge is beset by an innate conflict between the two knowledge systems. He noted also that knowledge is not value-free, and is either used as an instrument of social control or domination, or as a tool for conscientizing pupils. This view is supported by Bude (1985):

....the school can either contribute towards deepening or fostering the apprehension of the cultural environment by endorsing its values for the socialization process and thus by integrating cultural manifestations into the learning contents, or it can ignore or even negate these values and activities and thus accelerate the loss of cultural identity on the part of its pupils (p. 222).

Attempts to integrate school and community learning have sometimes led to accusations of creating a strong class bias, providing children with the skills and attitudes needed to fill pre-destined positions in the community and thus fixing their societal roles. Some schools were accused of destroying the best elements of communal life and introducing a new set of values unrelated to the old one.

These problems have led many community school movements to revise their strategies. Most now aim to meet community manpower needs and to be involved in activities directly aimed at improving community life, for example by providing services locally; agriculture is often an important element of the curriculum in these community-oriented schools (Bude, 1985, 1993). A number of technical factors have contributed to the failure of these efforts, however, namely lack of major commitment by policy makers and funders, lack of proper training for teachers, insufficiency of resources and a poor response on the part of the public, who prefer more prestigious academic programmes.

Judging by the problems described here, it would seem that there needs to be an acceptance that there are key elements of community knowledge that are important for stability and development, but equally there are other elements that are deficient; the acquisition of these deficient elements could lead to an improvement of the quality of life of rural people. The issue to be addressed, therefore, is how to facilitate a two way flow of knowledge and experience between the institutions of school and community (fig. 4).

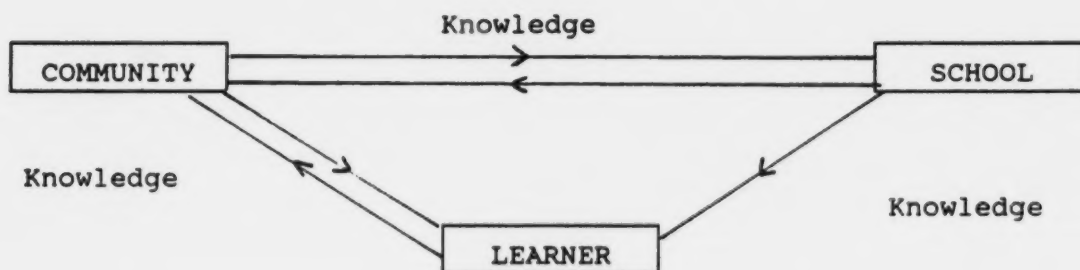


Fig. 2.4 A two-way flow approach to learning.

How may this be achieved in practice however? How can community and personal knowledge feed into the curriculum, whilst the learning achieved in school feeds back into the community?

One more element must also be dealt with which so far has been left aside, and that is the relationship between the knowledge of the community, the knowledge of the school and the knowledge of the child. In the approaches discussed so far, the knowledge and experience of the child has not been related or integrated explicitly into the learning process. Taking this into account, we could amend our diagram once more (fig. 2.5).

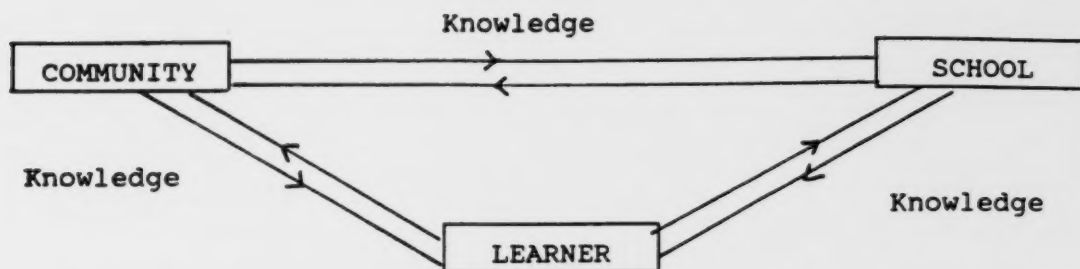


Fig. 2.5 An integrated knowledge system

Or alternatively (fig. 2.6):

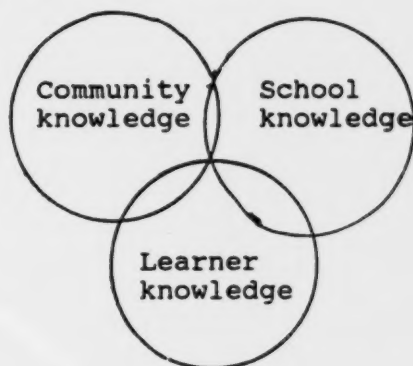


Fig. 2.6 An integrated learning system

Following on from this idea of an integrated learning system, we must now explore how it can be possible to "contextualise" this learning

2.3 Contextualising Learning

2.3.1 Some Current Thinking

Gulliford and Widlake (1975) quote John Dewey saying:
Children are people. They grow into tomorrow only as they live today;"

and also

... when we say a child cannot understand, we frequently mean that he has not had sufficient experience of the right kind to be able to understand.

More recently, Bloom (1992) notes that children's:
personal experiences, emotions, metaphors, interpretive

frameworks, and so forth serve to create a complex system of processes that affect the nature of their personal knowledge and how it is constructed (p. 399).

From this perspective, the educational development of a child is inseparable from the "being" which the child has become, brought about through a complex history of social interactions and related to the context in which the child has been raised. As children develop, they continue to construct their own being, and education as an experience can affect and contribute to this process. This "constructivist" approach to the way in which children learn has challenged the Piagetian emphasis on individual cognitive development and is the subject of much recent research and writing (Wheatley, 1991, Ritchie and Russell, 1991, Ritchie, 1994).

The argument as described by Bloom (1992) is that learning involves constructing meanings based on previous knowledge and experience, which can be semantic (formally acquired knowledge), but also episodic knowledge (personal experiences), interpretive frameworks, metaphors, emotions-values-aesthetics (EVAs) and the products of various mental processes (aspects of contexts of meaning). Contexts of meaning can involve traditional cognitive processes, such as categorizing, associating and inferring, and elaborating and story telling; these are influenced by other aspects of contexts of meaning, such as the above. Bloom suggests that the components of contexts of meaning, particularly metaphors, interpretive frameworks, and EVAs, substantially influence knowledge development processes.

We can summarise this discussion as follows. Although everyday out-of-school experience contributes to the knowledge constructed by a child, additional experience must be provided within the school environment which will enable a child to understand complex, conceptual learning of skills in science, mathematics and languages. In order to enhance a child's capacity to develop skills in these areas, however, it is essential to relate these subjects in some way to the child's own personal experience of life, and thus to integrate the entire learning experience. In order to meet the "essential learning needs" listed by Coombes, therefore, it becomes clear that the content of education programmes, the methods by which learning is facilitated, and the materials used to this end must all be pertinent to the experience and culture of the learners (Graham-Brown, 1991). One way to do this is to use tools such as metaphors and analogies to make learning more meaningful.

³ Constructivism is an epistemology which focuses on the role of the learner in the personal construction of knowledge (von Glasersfeld 1987). Learning is viewed as an adaptive process where the learner's existing knowledge is modified in response to perturbations which arise from both personal and social interactions (Wheatley, 1991)

2.3.2 Metaphors and Analogies

Metaphors and analogies are two means by which learning in school can be related to a child's own experience of life since they express abstract ideas by grounding them in concrete experiences (Black, 1977; Lakoff and Johnson, 1980).

Metaphors act as comparative mechanisms that link different types of information. White (1988) lists nine basic types of metaphors, the two most common types being those that link actions and those that compare attributes. Metaphors link observed phenomena with familiar phenomena, and the associative-inferential process is therefore facilitated by the metaphor. In young children, metaphors are usually rooted in an anthropocentric and anthropomorphic framework, but they assist in the learning process. Metaphors which are constructed by the children themselves and are meaningful to them enrich conceptual understanding. These are powerful tools for facilitating, establishing, and extending those understandings. Solomon (1986) concludes that the allusions to past experiences provide "metaphorical illumination" found in everyday discourse, and this becomes a means of reasoning about the unfamiliar and about problematic phenomena.

The use of analogies, on the other hand, have been described by Flick (1991) as

a cognitive process, that is evidenced by linguistic structures..., that establishes an association with previous experience in some way that may be explicit or implicit" (p. 216),

and that

Understanding is conferred on experience through a knowledge framework which functions as a cognitive mechanism for relating elements of the experience together" (p. 215).

White (1988) describes this knowledge framework as an interrelated complex of images and other sensory impressions, linguistic forms, kinaesthetic memories, as well as affective features of experiences. Gentner (1986) proposes that, through intuition, children couple the multifaceted knowledge frameworks of past experience with novel situations. One tool which can enhance this coupling is the creation of analogies, which have a explanatory-predictive purpose (while metaphors have a more expressive-aesthetic purpose). Duit (1991) states that, since learning is an active construction process and can only take place on the basis of previously acquired knowledge: Learning, therefore, fundamentally has to do with constructing similarities between the new and the already known. It is precisely this aspect that emphasizes the significance of analogies in a constructivist learning approach (p. 652).

Flick (1991) warns that any new instruction in school must constantly ask the pupils to reexamine past experiences. The

analogies that they intuitively make must be explicit to them so that they can construct on their acquired knowledge. Linking past experience with concept formation through instruction is not a matter of finding the right analogy upon which to base instructional design, but rather the provision of a stimulus to trigger off other relevant experiences. Specific analogies can be used as a useful instructional tool, but teachers should be sensitive also to the spontaneous or intuitive analogies created by students.

2.4 A way forward?

From the previous discussion, there appears to be a strong case in theory for relating school learning to a situation which is meaningful to children, i.e. a context with which they are familiar.

Two problems must be overcome in order to create a situation where learning becomes more meaningful for rural children, however. Firstly it becomes necessary to create a curriculum with a structure which lends itself to local development, allowing children to integrate their learning experiences undergone inside and outside school⁴. I would propose that an integrated approach to curriculum development could be a solution. Secondly, there is a need to identify a unifying theme or themes which can provide a basis for the integrated curriculum. The second proposition, therefore, is that, in rural societies, agriculture could play a key role as this unifying theme for rural-based school curricula.

⁴ Research has been carried out on this area in the United Kingdom. A description of it is included at Appendix B.

3 An Integrated Curriculum for Rural Schools

3.1 Integrating the Curriculum

In Section Two I described several, alternative views about the nature of the primary school curriculum. The concept of an integrated curriculum is rather different to those discussed earlier, in that the curriculum should not be distinctly, rigidly different, or indeed identical, for urban and rural schools, but should be flexible, allowing teachers to develop their own material which reflects the local environment, whether urban or rural. This approach emphasises the process of learning, rather than purely its content.

Bacchus (1982) defines integration as "the combination of the several components of an object, organisation or a system into a whole in order to render it entire or complete" (p.1). A curriculum developed on this basis may have a core, which is identified as essential learning for all primary pupils throughout a country, but the way in which this core is handled is not prescribed by central policy makers. In order to render the curriculum complete, additional, optional areas will be included, depending on the locality of the school and the background of the pupils and teachers.

There are strong arguments in favour of this approach. As Krogh (1990) states:

Most of the learning in our lives is along the lines of an integrated curriculum. (p.31)

Following this idea, Krogh suggests ways that integrated learning, which prevails in everyday life, could be incorporated in the school programme. The teacher can choose a theme, such as agriculture, create a web, and then add or subtract activities as it becomes apparent that there is too much or too little emphasis in some areas.

Bergman (1985) describes integration of the primary school curriculum as:

unifying a number of separate subjects in a larger one. This greatly simplifies the timetable and gives teachers more scope for organizing their teaching according to areas of interest. It also makes project-centred teaching possible (p.15).

Agriculture, for example, could provide an avenue through which children can have repeated experiences which help them to master cognitive, physical and social skills. Agriculture could be the basis of integrated projects incorporated in the school curriculum, with academic activities chosen for their locally relevant, experimental attributes. Since every curricular subject (language, reading, mathematics, science, social studies, art, movement and drama and music) is important to the development of children, ways can be developed which build on children's knowledge of agriculture and link this to other curricular subjects (an example of this

will be given in the next section). Teachers can create a good deal of their curricula by building "webs" made up of themes of common interest. This would be expected to enhance interest and thus motivation.

This flexible method of teaching is an extension to natural teaching which takes place outside the school. It can build on a child's experiences, covering the whole curriculum whilst developing skills in a meaningful context, as opposed to breaking learning down into categories by subject area, which is less natural, more forced, and less interesting or exciting. Through a web, academic, social and emotional needs can be met.

One impact brought about by this approach is to decrease the size of the teacher's territory, with a subsequent increase in the amount of input children have into designing their environment. In order to enhance this process, other types of inputs would be of great importance, for example, the preparation of special materials, such as workcards, worksheets, additional pictorial or taped material, guides on the use of audio-visual materials, materials information and reference books which are easy to read in a language of instruction familiar to the children, whilst introducing novel terms in a suitably paced way.

A great advantage of this approach to rural primary education is that it allows the curriculum to be made relevant to the experience of the learners, whilst still allowing the possibility for the development of knowledge, attitudes and skills identified on a national basis. This avoids the curriculum being perceived as an inferior version of the urban curriculum, therefore.

A major disadvantage, and it is a considerable one bearing in mind the constraints facing primary schools in rural areas, is that its success depends largely on the skill of teachers and the availability of suitable resources. Also, as I noted in Section Two, the experience, culture and "knowledge" of people who live in rural areas varies from one locality to the next; equally, within a specific area the knowledge and experience of individuals differs markedly. There is no single knowledge or experience which can be used as the basis for the curriculum, therefore. Metaphors and analogies should, if they are to be effective, be derived actively by the child, based on his or her individual experience. This makes it extremely difficult to develop rigid "relevant" basic education programmes on a national scale, and instead suggests that flexibility in terms of local development of curricula will become an important feature. This will need to involve a range of stakeholders, not only school representatives and other government representatives, but also community representatives, and of course the children themselves as they actively contribute to the learning process (Rogers and Taylor, 1995).

Curriculum planners at national level can deal with the difficulties posed by variations in "local knowledge" by identifying unifying themes which can provide a direct link to the experience of most or all of the learners in a particular area, and can also be readily adapted through participative processes to fit each local situation. Agriculture is one activity with which the majority of children in rural areas of the developing world are familiar, and so it has an important role to play here.

3.2 A Contextualising Role for Agriculture?

3.2.1 A Role for Agriculture

Even though the agricultural experience of individuals will differ, agriculture could be used as a vehicle to make school learning more meaningful. Metaphors and analogies could be based on agricultural activities and experiences, and thus enhance the acquisition of literacy, numeracy and the skills of basic scientific reasoning. Through the development of an integrated, flexible curriculum, local agricultural practices can be used as a basis for the development of learning webs and projects; children can then be encouraged to relate the learning process in school with the natural learning process which exists outside the classroom, and begin to provide the means by which the process of learning becomes continuous, in school and beyond. It could enable children to develop not only basic knowledge and skills, but also higher-order competencies, such as problem-solving and thinking skills, and broader competencies such as leadership skills, group skills and personal initiative (Black et al, 1993). The value of this could become evident to parents and employers, to pupils who have left school and find that they are able to apply what they have learned in their local communities, and to the school children themselves as they gain the satisfaction from their own personal development. These skills will be useful, too, to those children who do succeed in progressing to higher levels of education.

Let us consider the benefits which this approach might bring.

3.2.2 Benefits from using agriculture as a contextualising subject

i) Language

One of the reasons that primary school children in developing countries appear to face difficulties with the study of science and mathematics is that the language of instruction is unfamiliar to them (Eisemon, 1989). Cleghorn et al (1989) describe, for example, the situation in Kenya where restrictions on the use of languages other than English during instruction may ultimately hamper student understanding of important concepts. When instruction is in a second language and when the concepts being taught lack equivalence in the

students' language and culture, teaching involves a process of "dual translation".

Solomon (1987) notes that most cross-cultural studies in science education lean heavily upon the use of language to explore different meanings. This implies that cultural variation implies different ways of perceiving nature, and also, perhaps, that different languages directly affect how nature is understood. It seems to be the mother tongue, rather than the language of the school, which most affects the conceptual profile of children.

Vygotsky (1978) held that children's language "turns inward" to become the basis of inner speech and so of thought itself. This is not a problem where the curriculum is taught in the local language, but there are cases where subjects such as science and mathematics are taught in English, French or Portuguese, and these are not the first language of the child. Strevens (1976) made the point that most studies in the philosophy and the practice of science education embody two unstated assumptions: first that all the learners are members of the same culture, and also that they have the same common mother tongue. These assumptions are false, especially in developing countries. For example, in many rural schools, there might be different dialects spoken by teachers and pupils; there are cases when teachers have been posted to schools where a completely different language is spoken to their own. Another problem occurs when text books and learning materials are written in a different dialect or language than the "first" language of the children. Consequently, these pupils are disadvantaged in terms of language, not because their own is inferior or inadequate, but because they are required to conceptualise using words unfamiliar to them.

Strevens (1976) observed that the following problems were particularly common:

- i) un-analyzed difficulties of mutual comprehension between teacher and pupil, especially in spoken English.
- ii) the absence in the learner's own language of a word of expression equivalent to one in English
- iii) the absence in the learner's own language or culture, of a necessary concept
- iv) word-order difficulties (e.g. syntaxis, lack of familiarity with common everyday roots from Greek and Latin that enter the scientific vocabulary, lack of precision in the use of language, interference from non-decimal counting systems)

Agriculture could provide a means of solving some of these problems, as the use of metaphors unfamiliar to the children constitutes an impediment to the learner's understanding. If the teacher allowed children to construct metaphors and analogies using their own language and based on their own agricultural experience, this could be an aid to deeper understanding of complex topics. Bude (1993) describes how

children in schools in Cameroon use the medium of folk tales and fairy stories as metaphors and analogies, many of which are grounded in an agricultural context. Cleghorn et al (1989) point out that when language restriction does not operate strongly, as in the case of Kenya's rural schools, locally relevant examples are more easily brought into the lesson along with the occasional local term, hence meaning is better communicated.

Children could also relate abstract concepts which are alien to their own culture through the medium of their experience of agriculture and local practice. Connections can be made between the concrete cultural world outside the school and the semantic organisation of the abstract world being constructed through science lessons. Stevens (1976) points out that in many cultures measures are seldom exact, since approximation is more practical. In other cultures, weight and measures of weight are new ideas. The essential point, however, is that although a society and language may not employ concepts and terms that are identical with those of Western science, they will certainly have some concepts and terms which refer to number, measurement, agriculture, architecture, engineering, medicine, botany, and other fields of scientific activity. The cognitive task for the learner of science through English for example, is the acquisition of fresh attitudes towards observation and of terms for ideas which are partly new to him or her and partly just different from those already familiar. Agriculture can help to achieve a smooth transmission from one stage to another, therefore, since new concepts will be incorporated in a familiar topic.

Agricultural practice in many countries is also closely related to beliefs which do not fit into a Western "logical framework", such as magic, superstition and ritual. There is now a recognition that much superstition is actually based on sound scientific principles, although not articulated in this way; a medium such as agriculture could help to identify the links between "modern" and "traditional" thought, demonstrate that these are not always mutually exclusive, and at the same time enable learners to understand scientific concepts and processes which are beyond their experience.

Cleghorn et al (1989) highlight one major problem associated with the use of local languages at primary school level. As a result of using local languages, it is thought that children may fail to advance quickly enough in the official medium of instruction. When this is an examinable subject, and even a prerequisite for promotion to secondary school, failure to read and write to an accepted standard could lead to drop-out, repetition and general demotivation. They note, however, that in rural Kenyan schools, using vernacular languages and terms to explain abstract concepts appeared to contribute towards literacy in the sense that children paid more attention to the topic, understood better what they read, and were therefore able to relate to it and better transform it to knowledge. Combining the use of the vernacular language as a means to

induce understanding, with English, may have expanded the children's awareness of word meaning and language differences, helping to develop their English competency while also fostering understanding of the concepts being taught. Their research seemed to prove that the use of the occasional local term assisted the process of moving back and forth between locally relevant concrete examples and the abstract. Since most agricultural practices, processes and concepts do exist in vernacular languages, this means that they can be used effectively to explain natural phenomena, and thus enhance understanding. Also, where agriculture is used as a basic theme in an integrated curriculum, learning will not be confined only to everyday situations, but will facilitate the acquisition of a wide range of skills, eventually helping school leavers to achieve social mobility, should they desire it.

b) Integrating Science with Agriculture

Husen and Keeves (1990) describe a programme initiated by OECD with participation from Unesco for the redefinition of curricula in the areas of science, technology and mathematics education from kindergarten through to secondary school in its member states. A characteristic of this changing educational scene is the greater emphasis placed on science education at the primary school level. In some countries this is a new development, so there is scope for seeking innovative ways of devising suitable curricula. The Nuffield science projects in the United Kingdom have aimed to promote thinking by children through the integration of science topics. These developments were furthered as a result of the 1985 Bangalore Conference on "Science and Technology Education and Future Human Needs". The starting point for this conference was to identify issues that are essential for development, including food and agriculture, and to examine how science teaching could be developed without maintaining the division between the "pure" sciences, physics, chemistry and biology. This resulted in the generation of ideas and new techniques for science teaching at all levels on the themes mentioned. A meeting was held subsequently in Zimbabwe in 1990, which involved African teachers and curriculum developers, generating African materials for African schools on socially relevant aspects of the science they teach.

The inclusion of science in the primary school curriculum can provide an extremely efficient vehicle for teaching the skills of communication and of numeracy and for doing so in a natural integrated manner. Most important, however, is the concept that science teaching should be child-centred. Husen and Keeves point out that the way in which children solve problems is essentially a scientific way of working. School experiences need, therefore, to build on what children do naturally. Scientific enquiry is valuable because it helps children learn about their surroundings in a way which is natural and acceptable to them, by practical exploration relying heavily on sensory experience. Involvement and discovery help the

child to communicate. Activity-based curricula can allow children to gain concrete experience of the world (Haddad, 1986; Walberg, 1991; Ogunniyi, 1995).

Still, there is debate about how integrated science programmes should be developed. Gunstone (1985) comments that:

Despite much work, there still remains a remarkable diversity of views as to what integrated science is, what programs might be integrated and how content should be selected for them (p. 4465)

Agriculture can help to clarify this question, by providing an excellent vehicle for the contextualisation of science in several ways. First, as we have seen, it can help children to overcome the problems associated with words, meanings and contexts derived from unfamiliar environments and cultures.

Secondly, as Husen and Keeves point out,
Science could be characterised as concerned with *understanding why...* the enquiry approach of science is perfectly adapted to the psychological nature of pre-adolescents. It is in the nature of young children to be active and inquisitive (p.12)

Agriculture can provide practical activities which are grounded in scientific processes. Bergman (1985) has developed a schema demonstrating the relationship between agriculture and other scientific disciplines (fig 3.1). This relationship places the emphasis on the processes of science rather than the content. Agriculture can also provide a means of allowing children to develop, carry out and evaluate their own research projects; as a result, the nature of scientific enquiry is experienced rather than "taught". This can enable children to compare, analyze the benefits and constraints and identify linkages between traditional farming methods and "modern" methods (Yakubu, 1994). George (1988) describes how school pupils in the Caribbean study "modern" technology in order to develop problem-solving skills and to become aware of the social implications of the introduction of modern technology in a developing country, whilst at the same time recognising and developing the capacity of indigenous technology. Children can also develop their capacity for meta-cognition, and hence reflect critically on their own practices and experience; this may have a positive impact in the long run on agricultural innovation, production and rural development.

c) Links with Mathematics

Mathematics is the language by which one describes the order in nature and which in turn leads to a clearer understanding of that order.
(Mechling and Oliver, 1983b: 24)

Just as development of science-related skills and literacy are important for children, so is mathematics. Yet it is probably the subject most frequently cited as being a barrier to

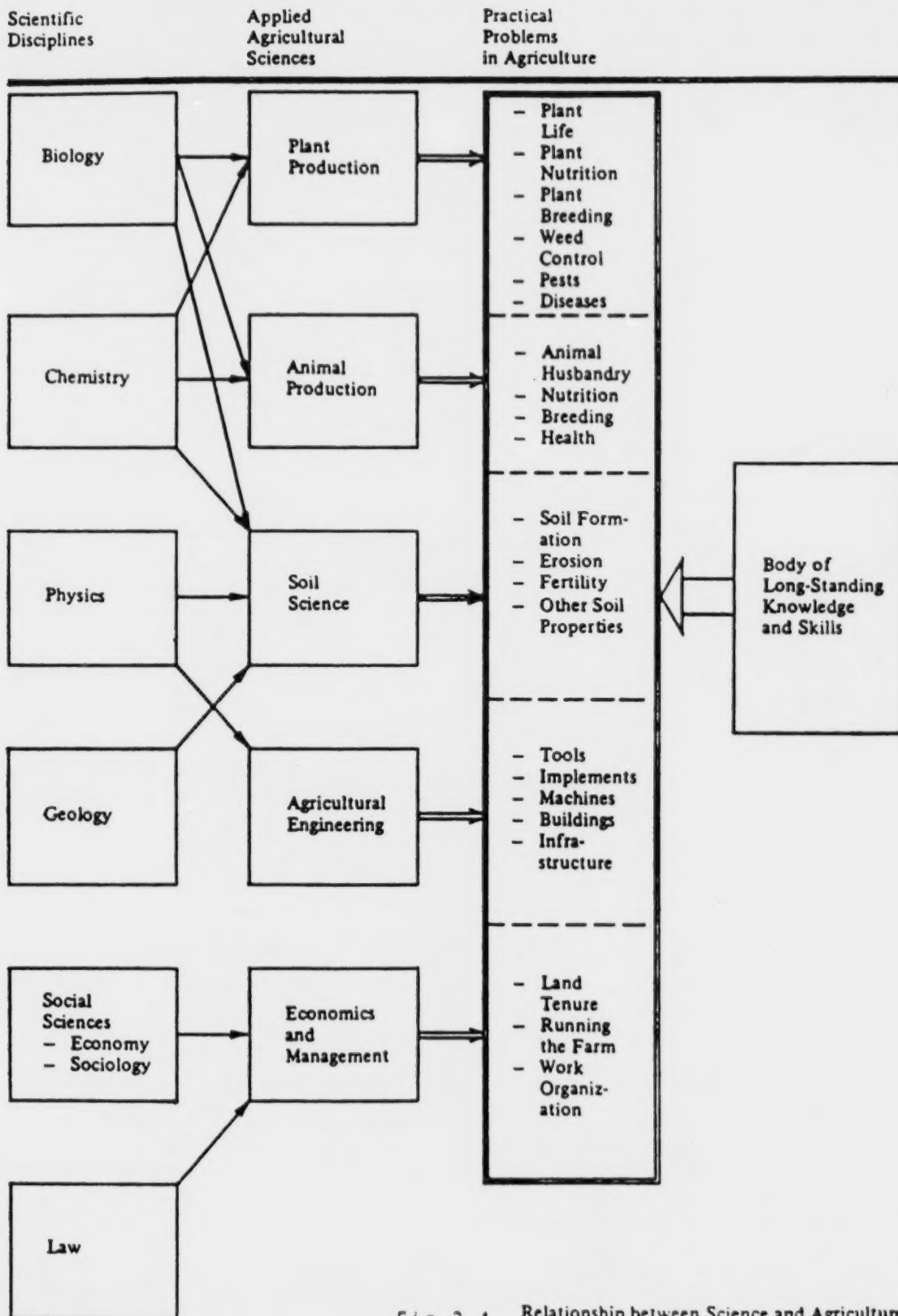


Fig.3.1 Relationship between Science and Agriculture

From Bergman, 1985

advancement through the school system. Some governments actually make mathematics a non-compulsory subject area for promotion to secondary school or to further education. The result of this is that an individual can proceed through several levels of the education system without being numerate. University entrance criteria in many developing countries are based on the attainment of a qualification in mathematics, since this is the factor which lends itself most easily as a cut-off point in a list of potential candidates.

Balfanz (1988) considers how the mathematical knowledge children develop on their own, outside of formal school instruction, can be used to increase the distribution and level of mathematical knowledge attained by students. Clements and Jones (1981) described a case study from Papua New Guinea which detailed the learning processes of a child who came from a society which did not have names for numbers; still it was evident that there was mathematical knowledge in the society, but conceptually quite different to the standardised, western-oriented version. Damerow (1986) notes that social and cultural conditions are strong determinants of the acquisition of mathematical skills, as are the organisational structure of the school system and the nature of classroom practice and interaction.

In the primary school curriculum in the Indian State of Meghalaya (1990) it is noted that:

The main objective of mathematics curriculum is to develop in the child the competencies which are relevant to real life situations that requires mathematical thinking, understanding of mathematical principles, knowledge and information about the social and economic application of mathematics. The mathematics curriculum at the primary stage should be related and relevant to the needs of a child as an individual and the society, hence huge stresses should laid more on the development of concept, skills and attitudes.

Agriculture can play a role in contextualising mathematics, just as it can for science, since it allows children to conceptualise mathematical principles as they relate to experiences with which they are familiar. Even if their vernacular language does not have terms for numbers, agricultural examples could be used to draw on the meanings which do exist in that culture, and bridge the gap between the two knowledge systems. Instead of creating despair over the abstractness of routine arithmetic calculations, the recognition that mathematics contains elements familiar to the lives of children outside school can help to reassure them, and hence build self-confidence and increase motivation. At the same time, we have seen that agriculture integrated into the curriculum can help to improve literacy rates, and this in turn should have a positive impact on the level of numeracy in children.

d) Links with Food, Nutrition and Health

Turner (1987) suggests that in order to achieve health for all, teachers must try to find ways to incorporate nutrition education more fully and effectively into the curriculum. She notes that successful teaching largely depends upon local initiatives and the level of cooperation between the school and teachers and the local community rather than implementing ideas produced by outside experts. It is unusual to find nutrition education as a separate subject in schools in any part of the world (Calloway et al, 1979), and it is accepted, therefore, that it should be incorporated into other subject areas in an integrated curriculum. At primary level, nutrition education very often forms part of thematic studies which include literature, mathematics, history and geography as well as science. Agriculture, food, nutrition and health are, by nature, very closely related, and it should be possible to define themes which integrate agriculture and nutrition into learning experiences in other aspects of the curriculum.

A survey by Turner and Ingle (1984) highlighted the variety and range of teaching approaches utilised in teaching nutrition in many countries, particularly in primary schools. Drama, poetry, music, art were included in the subject areas in which teaching about food and nutrition featured in addition to mathematics, geography, history, science and technology, physical education and home science (Unesco, 1983). This approach was based on the use of the local environment as a basis for activities which encourages children to be curious about their surroundings, to observe, explain, experiment and communicate their ideas and findings (Baez, 1980).

Turner (1987) describes the ways in which many primary school topics related to nutrition are frequently incorporated within a scheme which forms a part of an integrated programme of work and which includes aspects of health education and agriculture. A study of staple food, for example rice, cassava, or bread could be based on a visit to a local farm, market or the school kitchen. Work in science and mathematics can be extended by germinating rice grains and measuring the growth of seedlings. Food can be integrated into studies of geography and religious ceremonies, in order to better understand social and economic factors. Children can then learn more about the complex interactions governing attitudes to food, and hence learn about agriculture at the same time. Activities related to school gardens or farms can also provide a rich source of low-cost, easily available classroom material.

e) Links with Social Issues

Agriculture can be used as a means of preparing students to cope with sensitive biology-related social issues. The issue of birth rates and population control, for example, could be dealt with in an agricultural context by examining the impact

of changes in the population rate on agricultural production systems; this combines social issues in relation to both agriculture and biology, hence facilitating a two-way flow of information and a build-up of knowledge of farming systems and biological principles within a social context.

Knamiller (1984) notes that environmental issues are equally amenable to this treatment, since children have a wealth of environmental knowledge on which to base learning. Issue-based studies may help to sensitize young people to local development problems, bringing about a positive impact in the community.

It may be possible to deal with gender issues in a similar way. Krugly-Smolka (1995) reports that it is important to begin the process of changing cultural stereotypes in children before they leave primary school. Since farming activities in many parts of the world are performed by women and girls, the relevance of the agricultural context may be even greater for girls than for boys, especially if they are active in the process of metaphor and analogy construction. This could lead to the development of greater self-confidence in girls, and hence greater motivation to remain at school, helping to redress the problem of higher drop-out rates for girls than for boys at primary school level.

Finally, Krogh (1990) points out that as children mature, it is possible to move from ego-centred social studies to a focus on the rest of the society. By integrating the theme of agriculture into the curriculum, a domain of personal experience for most children in rural schools becomes the basis for primary school learning; this may help children make the difficult transition from orientation towards the individual to an orientation towards society.

3.3 Practical Applications

The main point to raise from this discussion, is that the key benefit of including agriculture as an element in the basic education programme of a nation today is not to teach learners to be agriculturalists, for whom there may be little or no employment. Indeed, as I noted earlier, the aims of many national basic education programmes reflect the desire to provide an education for their youth which will prepare them to make a useful contribution to national development within the framework of a global capitalist economy. As developing countries industrialise and urbanise, and individual nations become major regional exporters of food and agricultural produce, the role of agricultural education in basic education programmes as a preparation for agricultural employment has been increasingly questioned. The argument presented in this section is that agriculture may now be seen instead as a nurturing vehicle which can support the development of learners whose needs are extremely diverse, and whose life experience has been enriched by agricultural practice.

One means of achieving this is to use agricultural examples as illustrations of various aspects of different subject areas where the curriculum is still split into specific disciplines:

The handling of regular school subjects is localised, by relating the topics of the separate subject syllabi to the local environment; in this way, "the subject is the point of origin; the environment then functions as a teaching aid to illustrate academic themes and to serve as a practical ground for applying the acquired knowledge and skills" (Riedmiller and Mades, 1991: 29).

As described earlier, agriculture can be used as a means of enabling primary school children to develop skills in a wide range of subject areas. Many school text books for mathematics, science and languages now endeavour to include locally relevant examples, some of which draw on agriculture to provide the context for the learning. Some examples are given at Appendix C.

As we have seen, agriculture can also act thematically as the basis of an integrated curriculum. This would involve: the development of an integrated life-centred curriculum with teaching devised according to "centres of interest" or "projects" where traditional subject boundaries are given up as artificial. During a period of several weeks, for example, all teaching would be centred around a given topic, with language, arithmetic and science skills being imparted in the process" (op cit, p.30).

Bergman provides an example of how a scheme of work could be developed which uses agriculture as the basis for all teaching. Taking "yam growing" as the activity, one suggested section of the curriculum is shown in figure 4.1. This is a useful proposal, since it must be said that there is very little detailed information available about how agriculture has been used in this way. An examination and evaluation of cases where agriculture has been used as a contextualising vehicle would certainly be worthy of further research.

Month	Geography	History	Language	Mathematics
October	Yam-growing areas in Cameroon according to types of yams, sketches-plans-maps, yam growing in the rest of the world.	Yam-growing in our community - how yam was introduced - from where it came.	Preparation of farming activities; introductory text using the vocabulary related to yam growing.	Measurement of the plot; right angle, triangles, circles, trapezium; drawing to scale; the concepts of gross and net; farm area and planting area.

After Bergman (1985:38)

Fig. 3.1 Example of an integrated scheme of work, based on agriculture.

3.4 Some Conclusions

In this section, I have provided a theoretical basis for the application of agriculture as a cross-curricular theme in an integrated curriculum. I have also highlighted some of the direct benefits which this could bring to the learning environment in primary schools and provided an example of how it might be applied in practice.

Discussing this in theoretical terms is rather different than actually taking it forward to the level of practical application, however. In the next section, I will present some examples of how agriculture has been used as a contextualising vehicle in practice, before noting some of the issues which must be dealt with in order that the benefits discussed above may be accrued.

4 The Role of Agriculture as a Contextualising Subject in Primary School Education - Examples from the field

4.1 So far I have taken a rather theoretical look at the way in which agriculture may be used as a contextualising subject in an integrated curriculum. It is important now to look at some examples of how integrated curricula have been developed in various parts of the world, noting particularly the role of agriculture in these curricula.

4.2 Examples from the Field

4.2.1 Tanzania

Elstgeest (1987) notes that primary education in Tanzania is the only formal education some children will get. The purpose of primary education is, therefore, to provide and use experiences and to exercise skills which enhance the growth of understanding. In order to achieve this, children must be faced with problems that they can handle (according to their developmental level). By asking questions based on their own experience, the children can respond positively and build on their confidence and, therefore, their motivation. An example is given of the fifth grade class in Kigurumyembe, Tanzania, where children used equal amounts of soil, using washers and nuts as units of weight. They then translated their findings into a picture, and proceeded to establish what amount of water their soils could carry. Another example was of children counting the number of seeds in a cob of maize to assist them in developing skills in numeracy. When the children set out to count the seeds, they were surprised that there were 470 seeds, as many of the children had a vague idea of large numbers. Elstgeest notes that the children can learn that by manipulating and controlling the environment they can influence and control the response and behaviour of living things in certain ways; this demonstrates a particular value of agriculture as a contextualising subject.

4.2.2 Kenya

Black et al (1993) describe the Kisumu School Improvement Project. This was launched in 1990 in response to increasing doubts in the 1980s over the relevance of the school curriculum, imbalances between supply and demand of educated manpower, widening gaps between urban and rural standards and participation and a concern about the education of girls. Developments in this case were to come from the "bottom" and were to be creative; the strategies and teaching styles were to be appropriate and stem from the teachers and the identified needs of the children; they were to be classroom based (since the reality of the classroom must be the measure of success or failure); they were also to be holistic, with learning activities covering the whole range of children's emotional, physical and cognitive needs. Some of these activities were agriculture-based. The results appeared to be

an improvement in children's attitudes and motivation and led to higher attendance rates. Although there was an initial intention to allocate differentiated tasks to the individuals and to encourage group work, Black et al (1993) note that this did not happen to a great extent; still the children did appear to gain self-confidence. There was, apparently, a surprising lack of involvement in projects or in work which integrated subject topics, this being explained by the rigidity of the Kenyan curriculum. It was also noted, however, that although the same preset curriculum was followed, teachers felt less obliged to stick rigidly with it.

4.2.3 Uganda

Massey (1987) describes the Namutamba-"Basic Education Integrated into Rural Development" (BEIRD) curriculum development project in Uganda, which infused agriculture and appropriate technology into the curricula of teacher colleges and primary schools. The main period of the project ran from 1971 to 1979, but it was being revitalised in 1986 in order to address five basic problems: the lack of life-adaptive knowledge and skills among rural primary school graduates; a BEIRD organisational structure at national, district and community level; a curriculum that integrates practical and academic instruction; a BEIRD pre-service/in-service teacher training system and materials; and adequate primary school teaching materials and methods.

4.2.4 Cameroon

Bude (1985) notes that primary schools in the anglophone region of Cameroon have, since the 1960s, attempted to use the local environment for the development of cognitive abilities and also as the animation centre for community development. In the Francophone provinces, early efforts to increase the relevance of the curriculum seem to have foundered, whereas in anglophone provinces "a certain type of community orientation has for decades been an established part of the primary school curriculum and also of school-community relations" (p. 198). In addition to using locally relevant experience, schools have also forged and developed strong links with their local communities by supplying various services, for example agricultural advice to farmers.

4.2.5 Jordan

Badran, Baydoun and Subbarini (1987) describe how, in 1978, agriculture (production-oriented) disappeared from the school curriculum as a separate subject, and a subsequent disappearance of related topics from the science syllabus. More recently, reconsideration of the place of agriculture in the curriculum has brought about the realisation that the objectives of science education can only be attained by relating science to real, concrete situations, involving particularly the interaction of humans and the environment. Agriculture thus provides an ideal area from which pupils can

acquire an understanding of scientific concepts and develop scientific skills and attitudes. A framework has been suggested which attempts to integrate agricultural education as a major element of the science syllabus in the Jordanian elementary school system.

4.2.6 Papua New Guinea

Goelenboth (1987) describes "village orientated topics" in Papua New Guinea primary schools. Since most students do not proceed to secondary education, schools use agricultural related topics in order to provide students with skills which will assist in direct material improvement of village life after their graduation. It was proposed that education could be enhanced if there was a concentration on the key topics which are relevant to the agro-ecological conditions in the appropriate region. Such programmes appear to have shown that it is possible to improve conditions in the villages and thus encourage young people who have acquired relevant skills to remain there after completing school.

4.2.7 Sri Lanka

Peiris (1976) described an integrated approach to curriculum development in primary education in Sri Lanka. The basis of the curriculum was that children should carry out activities related to their own experience, using subject content as and when necessary in their work (through a project approach, planned well in advance and focusing on identified knowledge, skills and attitudes). Ideally the children would need no external pressure to work because the nature of the work itself would generate an enthusiasm producing an internal self-discipline. As a result they would be made more responsive to their own environment. Imitation of the work of others in classrooms and attempts to walk along well-trodden paths would be firmly discouraged, whilst creativity in all spheres of physical and mental activity would be positively fostered. A new curriculum was devised, therefore, setting up general guidelines for each content area. This involved listing experiences for primary-level children and placing them in relevant blocks of a cube, the three dimensions of the cube standing for time, place and human needs. A Teachers' Handbook for grades 1 and 2 were devised, which attempted to help the teacher to organise integrated learning through project work, at the same time paying attention to building up basic skills, e.g. language and mathematics. A child development studies project was set up to find out how the children develop concepts in mathematics. A spiral curriculum was devised to accommodate the needs of the teachers and the students in small rural schools, where a teacher was in charge of more than one grade. Although the preparation of the overall curriculum was centrally controlled, flexible guidelines were provided, and teachers were given freedom to draw up their lesson units and teaching sequences using the materials available locally. A problem noticed was that discovery-learning, advocated as a crucial component, was

hampered by the fact that literature and materials available for children did not meet the requirements of variety or suitability. To fill this gap, a new project was introduced to produce resource reading materials which would meet the needs of the new curriculum.

4.2.8 India

a) Black et al (1993) describe the Bombay School Improvement Programme which began in June 1989. This aimed to find concrete ways of addressing the problem of children's learning difficulties, to reduce the drop-out rate and improve community contacts in order to enlist the understanding, support and interest of the community; it was hoped that this would encourage children's motivation to learn. The overall aim was to foster child-centred learning, envisaging a move away from traditional textbooks towards curriculum materials developed by the teachers. Much of the advantage of such a move is predicated on the assumption of a rich resource alternatives for pupils both in the school and in the home. Some teachers thought, however, that this meant a move from textbooks to no textbooks at all; in fact it was intended that this child-centred teaching method could be introduced without replacing traditional textbooks. Moreover, parents were concerned that their children would not be able to learn in more traditional environments in the future if new methods of teaching were introduced in the primary school. At the end, the main difference in the teaching style was the greater emphasis on groups or individuals. The project has broadened the opportunities to develop higher-order skills as well as personal and social skills, and the children seem to have developed these to a greater extent. Black et al (1993) note that child-centred learning does have resource implications; there should be enough space and resources within the classroom as well as outside it.

Teachers need thorough guidelines also on how to implement the school curriculum and they also need good materials to support their teaching, but equally there is ample scope to produce teaching materials which are more supportive of child-centred teaching methods than the traditional textbooks. They note also that there are difficulties in adopting child-centred methods; teachers have to learn how to teach and children have to learn how to learn in the context of interactive groupwork.

b) Seshadri (1993) describes the Comprehensive Access to Primary Education (CAPE) project, launched in 1979 and implemented in 17 states in 1987-88, linked with the Primary Education Curriculum Renewal (PECR) programme. PECR has "developed relevant local specific learning experiences through decentralized curriculum planning. The learning experiences are drawn from the child's environment and the curriculum is directed to the attainment of certain essential competencies by the child" (p.45). Also noted is the UNESCO project "Teaching of Science and Technology in Rural Areas", developed at the Regional College of Education, Mysore, which is "based on the rural child's knowledge of traditional

science and technology in the socio-cultural context of rural areas of India" (p.47). Seshadri stresses the importance of building on the strengths of rural children, rather than maintaining a "patronising" attitude towards them because they are thought of as disadvantaged.

4.2.9 Columbia

Colclough and Lewin, (1993), and Colbert et al (1993) describe the development of primary school education in Columbia. In the 1980s, the urban primary net enrolment ratio (NER) was about 90%, whereas that in the rural areas was around 65%, with only 1 in 5 children in rural areas completing primary education. Cost units per child in the rural areas were much higher than those for urban schools, which meant that there was low internal efficiency of rural education directly related to the paucity of resources available to rural schools. Academic schedules were rigid and were reported not to take account of the special needs for rural pupils to help with agricultural and other chores. In the early 1960s, the Unitary School Programme conceived by Unesco was initiated. One teacher was required in each school to help children to teach themselves, children were allowed to advance at their own pace, teaching materials were designed in order to help the teacher work with many groups of students, the key elements were instructional cards or subject guides which gave more autonomy in learning to the pupil. Children could then leave for agricultural work and then come back and work at their own pace. The problems, which made it impossible to generalize the programme throughout the rural areas in Colombia, was that although it dealt with the learning process at the level of the child, it failed to address the fundamental concurrent changes needed in the national curriculum, in teacher-training methods, and in the local supervision of the system, for the programme to be a success. "Escuela Nueva" then began in 1975, building upon the experience with Unitary schools. The new curriculum allowed the possibility of teachers to make their own adjustments in line with local circumstances. This provided practical problem-solving experiences. The criterion for advancement was the ability to apply knowledge within the community. Links between the community and the schools was emphasized, and the use of local materials was advocated. Teachers were given training and material incentives. Central authorities retained responsibility for the design of the programme and for providing practical support, whereas the training and implementation became the responsibility of regional and local officials; in practice this meant that curricula especially designed for rural areas could be more easy to introduce when teachers were trained locally. Escuela Nueva had 4 major aims: to provide a full 5-year primary course in all rural areas through multigrade teaching methods; to improve the internal efficiency of rural education with increased relevance, flexibility and new evaluation procedures; to reduce drop-out and repetition; to improve human and material inputs and reduce expenditure. The Escuela Nueva students scored higher

in academic achievement tests. Teachers also believed that it was superior, and it enhanced their participation in community activities. Nevertheless, despite improvements, the quality of schooling was still lagging behind that in the urban centres.

4.2.10 Brazil

Harbison and Hanushek (1992) describe the introduction of the Northeast Basic Education Project (EDURURAL), set up in 1980 as an integrated educational programme. It was financially supported by the World Bank and the government as a single-purpose educational programme, which was aimed to target the least developed areas, and besides other things, assist in the development of curricula especially designed to the poor rural environment, where drop-out, repetition and non-attendance rates were very high. Only 40% of the primary school teachers had themselves completed primary school. EDURURAL was an ambitious social programme that sought to raise achievement by providing standard packages of incremental learning resources to a large number of schools. It was designed to expand children's access to primary schooling, to reduce wastage of educational resources inherent in grade repetition and dropout as children progressed through the system and to increase achievement by improving the quality of instruction. The EDURURAL project succeeded in the final two years of evaluation in improving delivery of the desired inputs, at least in two of the three states, but the change was only modest when comparing the inputs of the rural areas with these of the urban areas. In particular, wastage declined more rapidly in EDURURAL schools but there is no support that the EDURURAL project improved pupil flows as promotion rates did not increase. The programme contributed in setting up new schools and expanding others. Overall, however, there is little evidence that EDURURAL contributed directly or indirectly to school survival. There was no compelling evidence after 4 years it was launched that EDURURAL in fact had begun systematically to achieve its ultimate objectives.

4.2.11 Malaysia

Seymour (1974) described curriculum development in Sarawak, which is primarily an agricultural state. In order to move away from the traditional production oriented approach to agricultural education, a "New Syllabus" was introduced. This integrated the subject matter of the lessons during the first two years, in order to "reinforce the learning of one subject by the learning of another" (p. 281) The syllabus indicated approaches and techniques to make the subjects more relevant to the experience of the student. While the curriculum was not especially designed for rural schools, teachers in training were taught how to use the agricultural and rural experiences of their students to convey scientific laws and processes more clearly. However, many teachers could not understand the value of integrating subjects in lesson units, since this method seemed to make it more difficult to coach the learning of the basic skills. Regarding the agricultural emphasis, teachers

seemed to pay lip-service to this, because in their eyes children came to school to become literate and not learn what they already know and try to escape from. Different groups had different perceptions of the purpose of primary education; the administrators wanted to provide education that would assist national development; the teachers wanted to prepare some students for secondary education; the parents seemed to want increased upward social mobility. Teachers appeared to be so focused that even when teaching science and health, which have useful and practical applications in the tropical agricultural environment, they did not use the recommended visual aids, demonstrations and field work exercises. This could be accounted for to some extent by the limited education, abilities and expertise of teachers. Since these participants differed so much in their perceptions of the purpose and process of schooling, there was a problem in achieving a level of cooperation which would ensure that students were taught in the way they were supposed to be. Seymour stressed that since different groups (administrators, teachers, parents and students) share different values, perceptions and experiences and exist as subcultures, each can influence the acculturative process of the school at various stages either directly or indirectly. Different interpretations of educational goals and content among administrators, teachers and parents can influence teachers so that there may be a discrepancy between curricular objectives and instructional activities. This would have broad implications for the effectiveness of using agriculture as a means of contextualising learning.

4.3 Lessons Learned

These case studies reveal that a wide range of efforts have been made to develop integrated, flexible and locally relevant curricula. Some important points to note are as follows:

- i) the way in which the curriculum has been "integrated" varies considerably; in some cases it is fully integrated, in others it is partially integrated;
- ii) the way in which the curriculum is designed and the way in which it is implemented at school level may differ considerably;
- iii) a number of factors seem crucial to successful implementation of integrated curricula:
 - ♦ adequately trained teachers (both pre- and in-service)
 - ♦ motivated teachers (with adequate remuneration and sufficient length of posting)
 - ♦ books and materials developed to meet the needs of an integrated curriculum and the locality of the school
 - ♦ access to relevant resources (farm, practical facilities, not necessarily owned by the school)
 - ♦ support by the local community/parents

- ♦ participation between the school, local community members and all relevant stakeholders in the development of educational programmes
 - ♦ sustained government support
 - ♦ examinations tailored to the requirements of the curriculum;
- iv) curricula reform cannot solve all the problems faced by rural schools; complimentary social and economic reforms must go hand in hand with curriculum development;
- v) agriculture seems to fulfil an important role in the development of integrated curricula for rural schools as it provides a unifying theme, familiar to the lives of most rural children (fig. 4.1);
- vi) including agriculture in the integrated curriculum has other "pay-offs", including the possibility of improving relations between school and community, thus increasing the likelihood of parents sending their children to school

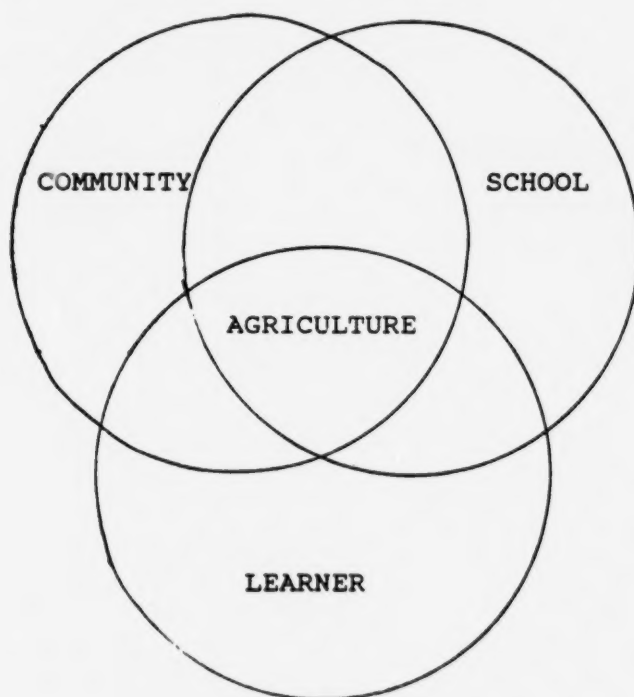


Figure 4.1 **The role of agriculture in the integrated curriculum.**

4.4 A Case Study from the United Kingdom

The focus of this paper has up until now been mainly on the situation in developing countries, and the range of examples presented here reveal that many innovative approaches to curriculum development are being attempted. It is interesting to note that work is also being carried out in the United Kingdom at present. The following case study is an example of how agriculture has been used as a basis for the development of an integrated curriculum in a rural primary school in the UK.

Case study: "Farming and the Countryside as a Context for Learning"

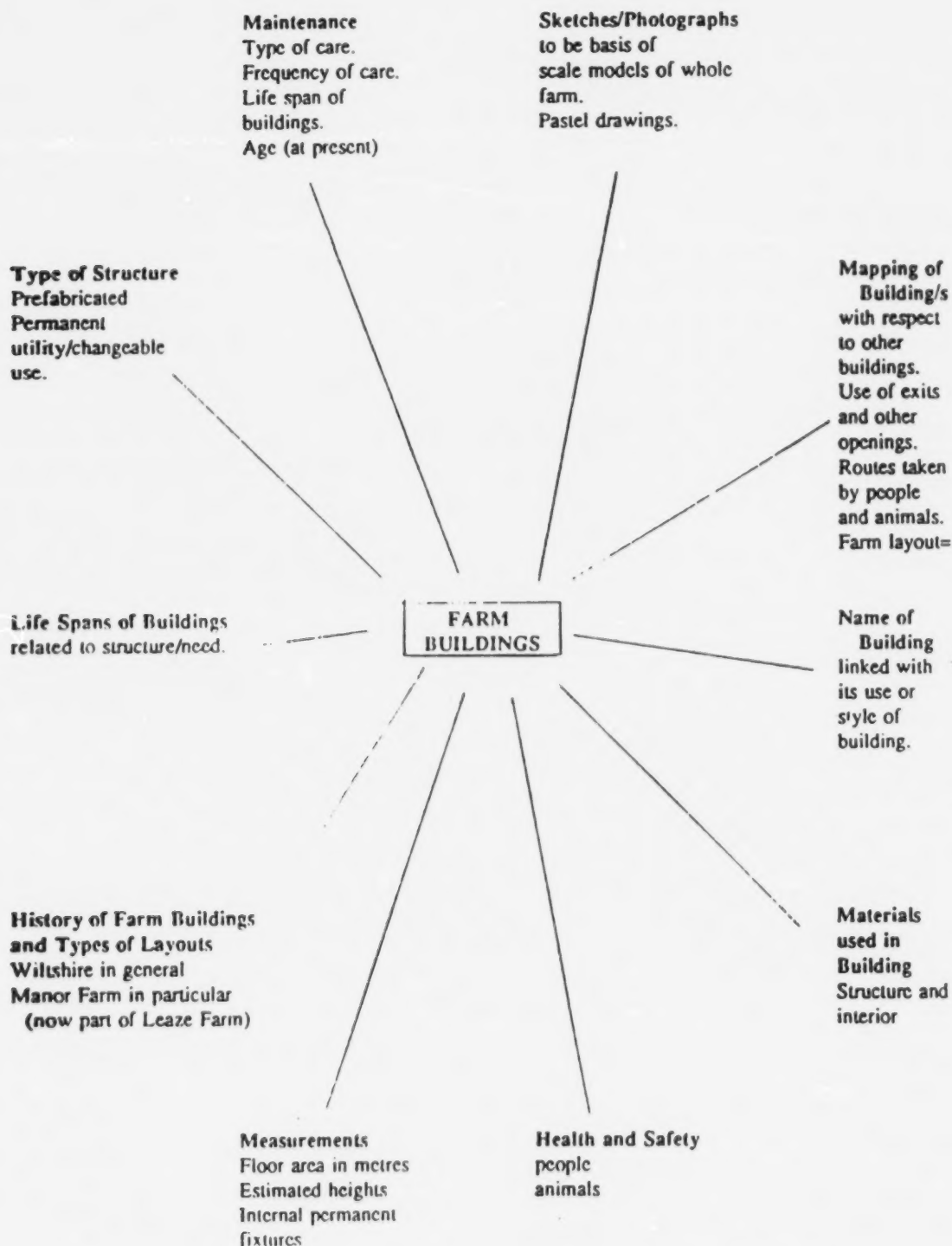
This case study is based on a visit which I made to an English, rural primary school in connection with this research. Obviously the methodology used by the teacher in this case could not be adopted in other situations without adaptation, but it provides a valuable insight into how agriculture could be used to form the basis of a learning web and the benefits of this approach.

This example formed part of a National Farmers Union project, entitled "Farming and the Countryside as a Context for Learning" (A Joint Project between the NFU, Farmers in Wiltshire and Berkshire and seven Wiltshire Primary, Middle, Secondary and Special Schools, June 1992-June 1993). The prime mover behind the overall project was a farmer who set up an education centre on his farm - a "farming classroom" - and had employed a part-time teacher to help run it. Interest in the project was created by inviting teachers to an open day held at this farm.

The objective was to look at agriculture as a suitable project for school work, achieved through the development of farming/education links. Most schools used animals and crops as a basis for their projects, but the teacher at the school in this case happened to be about to deal with the topic of architecture/buildings with her group. On her own initiative she found a local farmer who had enough different examples of buildings and structures (from a milking parlour to a dovecote) on her farm to offer a worthwhile experience, and enough material to fit in with the requirements of the national curriculum for England and Wales.

The children involved were aged 9-11. A plan was made of activities, and a topic web constructed (see fig. 4.2). This crossed the whole curriculum, covering aspects like farm accounts, milk quotas, safety and health, scale modelling, reporting and drawing, and of course the buildings themselves. Although the topic ran for one term only, repeat visits were made throughout the year so that children could see the different uses made of buildings.

Fig. 4.2 FARMING AND THE COUNTRYSIDE AS A CONTEXT FOR LEARNING



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Apart from the benefits to learning, the project led to greater community involvement by the school (teacher and pupils) and the farmer through public discussions and newspaper articles. This helped to foster public awareness. The teacher also formed contacts for future projects.

Interviews with the teacher and the farmer, and a review of the work carried out by the children revealed a number of interesting implications.

a) The view of the teacher

The following were the views of the teacher concerned:

1. Children younger than 11 years seem to be more interested in a topic than in separate subjects - they like something to home in on. They relate to a topic in a way that they don't with separate subjects. After age 11 it seems more suitable to start introducing subjects such as "science". Young children need to connect everything and put it into context. They see subjects as "work", and topics as part of the natural process of learning (in that they don't realise that they are "working", since the experience is fun and interesting).
2. It is quite easy to fit what is required by the National Curriculum around almost any topic.
3. This approach also transfers to the community, as children like to take home a "product", which can be created using a topic approach. Thus parents get to know what their children are doing at school and can relate to it.
4. The topic approach gives teachers something to hang on to as well - it makes teaching more meaningful; this is a motivating factor.
5. Commercial firms in the UK are beginning to produce a lot of high quality, topic-based material to support this type of learning, but teachers must still generate a lot of material themselves (see Appendix D for examples).
6. The topic approach caters for a diverse range of abilities at primary level. With a rigid subject approach, "the brightest are bored silly, the less able can't keep up". The difference in abilities is also emphasised to the teacher rather than to the children; this means that individuals are not picked out for special attention, maintaining a communal, group approach. Children aged 10 and 11 are just becoming aware of individual differences, and this approach helps to avoid ill-feeling, keeping the focus on learning.

7. Many teachers are not trained to deal with this method, but it could still easily be addressed through in-service training where this is group oriented.
8. Although it has these benefits, the topic approach is physically demanding, and requires very careful and rigorous planning. Only then can the teacher afford to be flexible to build on the unexpected event.
9. Discipline is not a problem, since if planning and classroom organisation is done adequately, all the children will be involved all the time. They can either be working in groups as a group, or individually within the groups. In the school I visited there were five groups in the class, the members of three doing individual work and the members of two involved in group - teacher intensive - work. The teacher set five tasks, one to be done each morning, and she rotated the groups from Monday to Friday; "once Monday starts, that's it for the week". She evaluates as she goes, and adapts and makes changes to the activities from day to day according to how well they are going. She also uses a mentor approach, team-teaching with a probationer teacher, grouping two classes together - this keeps even more groups active and allows more effective evaluation, because each teacher has a different perspective about classroom events; each teacher also contributes from their own area of expertise. Also, children relate differently to the different teachers - male/female or different personalities - allowing them to express themselves more fully. The only problem arises if one teacher has to leave the group, since one is left with up to 60 children alone! Children help each other too.
10. There is a lot of parental involvement at the school. A different parent comes in each day to help out, voluntarily - they need to be selected carefully to ensure that they are more help than hindrance. This means that more parents are involved in the school (sometimes even after their own children have left). Several parents came on the farm visits to help out, which proved to be a learning experience for them, too.
11. This kind of approach requires considerable team-work amongst staff across the whole school. It needs sound leadership from the Head teacher, encouraging and giving time to staff for preparation, and also to see what goes on in the other classes, so that work can be linked from year to year.

b) The view of the farmer

An interview with the farmer allowed a different perspective to be gained. The teacher had taken the educational lead, approaching the farmer and giving an outline of what was required. The farmer made some preparations, e.g. making a

scale drawing of the farm, and contributed to the discussions about the approach to the exercise.

During the project's life, community links between the farm and other farms in the area were strengthened because the original farm was split up and some of the original buildings now lay on other peoples' land; hence permission was needed from a range of people to let the children have access to everything.

Farmers are becoming very interested in education as a means of tackling the bad publicity they are getting at present in the United Kingdom over animal welfare and environmental issues, and the resultant poor image amongst the public. Children seem to take media commentaries very literally, so farmers need a chance to state their case. From this point of view, the countryside is a means of linking people and encouraging a two-way exchange of education. Even the adults who accompanied the children on the farm visits became involved in the discussion, so they learned and contributed something too.

The farmer was keen to follow up the experience with other similar activities; she felt that the linking of rural communities with each other and with urban communities is bound to happen, so it is better to be proactive and create a conducive atmosphere now.

It was felt that this project was successful because all the partners were willing; no-one was forced into it. Another reason for its success was that farm-school links can present the truth about farming in a meaningful way, providing an understanding of the whole picture, i.e. the farming system, the farm as a business and as a form of livelihood, and not just the elements which most people are aware of such as the vision of farming in England as a rural idyll.

Conclusions

This project had several important effects. Firstly it enhanced learning, but not only for the children. In fact, as the farmer noted, "the educational bit works both ways"; farming/agriculture provided a way of contextualising learning, and at the same time the experience allowed the contextualisation of farming for the children as they were presented with experiences to which they could relate and understand the picture holistically. It was not possible during the research visit to assess the impact of the project on test scores or assessment ratings of the children, but the standards of pupil performance had been at least maintained.

Secondly, the impact of the project was social, as well as purely educational. Links were strengthened between school and community in ways which were not predicted at the outset. The willingness to participate by all parties was a major contributor to its success.

A third, and most important, factor to consider, is the level of management required. Both the teacher, (trained, with many years of experience), and the farmer were innovative and committed; much hard work was involved in activities such as preparation of teaching materials, organising visits and arranging external assistance. This was of crucial importance to the effectiveness of the project.

4.5 Implications

The examples and case study presented in this chapter reveal a number of benefits, but at the same time there are many critical factors which can lead to the success or failure of the strategies described above.

The final section will highlight some crucial issues, and attempt to make some suggestions which may be of value for the future development and application of the concepts presented in this paper.

5 Issues for consideration

In Section One I noted a shortlist of three groups of factors (Lockheed and Levin, 1993) which appear to contribute to a primary school performing effectively. This same list can provide a good basis for an examination of issues relevant to the discussion in this paper.

5.1 Necessary Inputs

a) Curriculum

The selection of content of the curriculum is crucial. We have seen that a conflict has arisen in recent years between the "modern" and the "traditional". In many curricula, modern science and technology has been elevated to a position of superiority over traditional practices and beliefs. We must remember, however, that the purpose of schooling should not be, necessarily, to "modernise" the farming methods of the local societies, but to build on what the children already know, and to give them the skills to make the best inferences possible and reach optimum decisions. This should then prepare them to take advantage of new technology where it is appropriate and applicable to their own situation. It is essential, therefore, to ensure that basic "school" knowledge not only builds on the experience of the child, but integrates this experience throughout the entire learning process. The curriculum should integrate the knowledge of the child with rural peoples' knowledge and with school knowledge. This is why curriculum development is so important at local level.

In integrating the curriculum it is necessary also to review and construct links between various subject areas which normally are taught separately. We have seen that it is possible to integrate part of the curriculum, for example primary science, and use relevant examples from local agriculture instead of the typical textbook facts and figures derived from developed countries. This half-way house approach can be very useful, and may be the most feasible in some situations. Still, agriculture presents great opportunities as a basic theme for the creation of learning webs which bridge the whole curriculum. In this case, the school would need to eliminate the overlap between what is taught in different areas and should develop a structured progression from year to year in which teachers with different specialisations participate in curriculum planning and evaluation. This is helped by the fact that teachers in primary schools are normally generalists rather than specialists and therefore may find it less difficult to make connections between different subject areas than their colleagues in secondary schools.

b) Instructional Materials

Appropriate instructional materials are vital if an integrated approach to curriculum development is to succeed. Although

some material is being published which has local relevance, there is a problem that publishers need to sell fairly large quantities of an educational book or package to make it viable financially.

This has two implications. Firstly publishers may need to produce material which is more suited to open-learning, with less concrete, factual material and encouraging discovery learning and problem solving by the readers. Factual elements could be covered in rather more specific information packs, closely tailored to the needs of specific agro-ecological zones, for example. In the future, different kinds of media will support this approach, particularly CD-Rom and other forms of information technology, although many rural primary schools are still far removed from the possibilities that new technology presents.

Secondly, schools will need to be much more active in producing their own materials; children can contribute to this process by evaluating the materials used each year, which can be revised as appropriate. As children use the materials, they may themselves contribute material which can be incorporated elsewhere. This has implications both for resources, and for teacher training.

c) Time for Learning

Topic-based learning requires a different time-frame to the traditional subject-based approach. It is important to seize unexpected opportunities which children themselves create, and to create a built-in flexibility; some activities will take longer than expected, others shorter. This will require discussion and internal organisation within schools. Because of the nature of a topic-based approach, however, it should be possible to use agricultural themes in line with local agricultural activities at certain times of the year; this will increase the relevance of the teaching, and at the same time help to avoid the conflict between parental demands for seasonal labour and school attendance.

d) Teaching Practices

Training of teachers to integrate contextualising themes in their teaching will be essential. It is too much to expect that teachers who have been themselves taught by rote-learning methods and may not have had any pedagogical training could suddenly adopt wholly new strategies. Diong (1987) notes that in most classrooms "teach-to-pass the examination" and "complete-the-syllabus" practices predominate. When using an integrated curriculum it is necessary to develop much broader, versatile teaching strategies, for example the experimental approach, role play, project work, using questions to guide enquiry and problem-solving. Teachers will have also to develop and use novel assessment procedures, since the examinations system would require some degree of localisation. For this to happen, teachers will need support and

encouragement to develop courses which they feel confident to teach and assess and which meet the needs of their students. Programmes of pre- and in-service training, materials and financial support, and a strong backing from school administrators, parents and the children themselves will be crucial; in many situations, this will take time, however.

5.2 Facilitating Conditions

a) Community/Parental-school relationships

These will be of great importance if an integrated curriculum is to be developed which draws heavily on community practice, knowledge and experience. There seems to be mixed feeling amongst parents and community members about the value of primary school education; feelings are even more polarised when the curriculum appears to use as its basis what children know already. Many parents would make the assumption that school should bring about learning in areas unfamiliar to their children. Since the approach advocated in this paper depends on these two situations being integrated, it is crucial that parents and other influential members of the community should be involved from an early stage in any experimentation with curricula which are rooted in local practice and culture.

b) School-based professionalism

An integrated approach to curriculum development will require much greater levels of participation between school and community members, and between teachers from what are seen as different subject areas. It was remarked above that this is helped in primary schools by the fact that most teachers are generalists; indeed in many primary schools there is only one teacher (in this particular case, multi-grade teaching may be made more feasible using a broad-based thematic curriculum, with different tasks set for appropriate ages or levels of children). Where an administrative hierarchy exists, however, understanding and support from head-teachers will be necessary to enable teachers to follow practices which may seem radical to those familiar with more traditional, subject-based teaching processes.

c) Flexibility of Curricula

In order for agriculture to play a role as a contextualising subject, it is necessary to create a curriculum structure which will enable this to happen. The development of an integrated, topic-based curriculum would be the best way of achieving this, entailing most of the development taking place at local level, and ideally involving a wide range of stakeholders from community, school and government. Flexibility would be crucial. It would still be possible for a central curriculum authority to decide on aims which would fit national requirements for education and development, but

decision-making about the precise content and the teaching and learning processes should be decentralised.

5.3 The Will to Act

a) Centralised Decision-making

I have noted above that a much wider range of stakeholders will be involved in the planning, implementation and evaluation of an integrated curriculum. This will be much more difficult where government departments create a rigid, centralised, examination-oriented curriculum. In order that local curriculum can be developed, central planners will have to devolve some of their power. This will also have resource implications; it may be necessary not only to give schools and school teachers the right to develop their own curricula (based on overall, national aims), but also to give them the resources, both financial and material, to enable them to do this. It might be necessary also, to revise the examination procedures and localise them more extensively, perhaps by extending continuous assessment practices. There would certainly opposition in some quarters to this idea; the pay-off from success could be great, however. It would be useful for schools to identify key policy makers in the primary school sector who could be persuaded of the value of some limited experimentation in order to estimate the effectiveness of the integrated approach. This leads us into the next, and final, point.

b) Vision

It is true to say that the problems facing rural primary schools in developing countries are enormous, for all the reasons described in Section One. We have seen, too, in the examples given, that innovations in primary schooling often fail to deliver what is expected of them. The approach suggested in this paper could provide some schools in some situations a means of tackling some of the problems which they face, however. In order to do this, it is necessary that some groups and individuals commit themselves to trying a more radical approach. Research can aid this process. It should be possible to identify schools which have used agriculture specifically as a contextualising subject in an integrated curriculum, and to evaluate the impact of this on school attendance, school performance, and on the resultant productivity in the community. New efforts to use agriculture in this way could be trialled, evaluated and adapted for further implementation. There are many examples of innovative practice which can be drawn on (as illustrated in this paper); vision has certainly not been lacking in a number of cases on the part of educational planners and policy makers, teachers, parents and community members, and indeed pupils. Although problems and constraints have been encountered, so have opportunities been taken up and obstacles overcome. It is to be hoped that this process may be encouraged to continue through a programme of research and evaluation.

REFERENCES

- Bacchus, M. K. (1982). "Education for development in underdeveloped countries". In *Comparative Education*, vol. 17, no. 2.
- Badran, A., Baydoun, E. and Subbarini, M. (1987). "A syllabus for agriculture education for elementary school pupils in Jordan". In A. N. Rao, *Food, Agriculture and Education*. Oxford: Pergamon Press, pp. 137-140.
- Baez, A. V. (1980). "Curiosity, creativity, competence and compassion - guidelines for science education in the year 2000. In: McFadden, C. P. (ed.), *World Trends in Science Education*. Halifax, Nova Scotia, 1980.
- Baker, V. J. (1989). "Education for its own sake: the relevance dimension in rural areas". In *Comparative Education Review*, vol. 33, no. 4, pp. 507-518.
- Balfanz, R. (1988). *Elementary school Quality: The Mathematics Curriculum and the Role of Local Knowledge*. Paper presented at the Annual Meeting of the Comparative and International Education Societies, Atlanta, Georgia, March 19, 1988.
- Barnard, R. (ed.) (1982). *The Integration of School and Community Learning in Developing Countries. A Report of a Workshop organised by the Department of Education in Developing Countries, March 1982*. London: Department of Education in Developing Countries, University of London Institute of Education.
- Bennet, N. (1993). "How Can Schooling Help Improve the Lives of the Poorest? The Need for Radical Reform". In Levin & Lockheed, pp. 41-51.
- Bergmann, H. (1985). "Agriculture as a subject in primary school". In *International Review of Education*, vol 31, pp. 155-174.
- Berstecher, D. and Carr-Hill, R. (1990). *Primary Education and Economic Recession in the Developing World since 1980*. Paris: Unesco.
- Black, M. (1977). "More about metaphor". In *Dialectica*, vol. 31, pp. 431-457.
- Black, H., Govinda, R., Kiragu, F. and Devine, M. (1993). *School Improvement in the Developing World: An Evaluation of the Aga Khan Foundation Programme. SCRE Research Report, no. 45; ODA Evaluation Report EV545*. Scotland: The Scottish Council for Research in Education.

- Black, D. And Solomon, J. (1987). "Can pupils use taught analogies for electric current?" In *School Science Review*, vol. 69, pp. 249-254.
- Bloom, J. W. (1992). "The development of scientific knowledge in elementary school children: a context of meaning perspective" . In *Science Education*, vol. 76, no. 4, pp. 399-413.
- Bude, U. (Ed.) (1985). *Primary Schools, Local Community and Development in Africa*. Baden-Baden: DSE.
- Bude, U. (Ed) (1993). *Culture and Environment in Primary Education*. Bonn: DSE, ZED.
- Calloway, D. H., Gordon, H. F., Grodner, M. and Pye, O. (1979). *Position of Nutrition Education within Educational Systems*. Paris: Unesco.
- Chanan, G. (1976). "Culture and Equality in Education". In *Educational Review*, no. 18, pp. 108-116.
- Cleghorn, A., Merritt, M. and Abagi, J. O. (1989). "Language policy and science instruction in Kenyan primary schools". In *Comparative Education Review*, vol. 33, no. 1, pp. 21-39.
- Clements, M. and P. Jones (1981). *The Education of Atawe*. Papua New Guinea: Mathematics Education Centre Report.
- Colbert, V., C. Chiappe & J. Arboleda (1993). "The New School Programme: More and Better Primary Education for Children in Rural Areas in Colombia". In Levin & Lockheed, pp. 52-68.
- Colclough, C. and Hallak, J. (1975). *Some Issues in Rural Development: Equity, Efficiency and Employment*. Discussion paper, no. 89. Brighton: Institute of Development Studies, University of Sussex.
- Colclough, C. and Lewin, K. (1993). *Educating All the Children: Strategies for Primary Schooling in the South*. Oxford, Clarendon Press, xii+332pp.
- Coombes, P. (1985). *The World Crisis in Education. The View from the Eighties*. Oxford: OUP.
- Cox, T. and Jones, G. (1983). *Disadvantaged 11 Year Olds*. Oxford: Pergamon Press.
- Damerow, P. (Ed) (1986). *Mathematics for All. Problems of Cultural Selectivity and Unequal Distribution of Mathematical Education and Future Perspectives on Mathematics Teaching for the Majority*. Paris: Unesco Press.
- Diong, C-H. (1987). "New directions for the teaching of food and agriculture". In A. N. Rao, *Food, Agriculture and Education*. Oxford: Pergamon Press, pp. 95-104.

- Duit, R. (1991). "On the role of analogies and metaphors in learning science". In *Science Education*, vol.75, no.6, pp. 649-672.
- Eisemon, T. O. (1989). "The impact of primary schooling on agricultural thinking and practices in Kenya and Burundi". In *Studies in Science Education*, vol. 17, pp. 5-28.
- Elstgeest, J. (1987). "Children and Agriculture". In A. N. Rao, *Food, Agriculture and Education*. Oxford: Pergamon Press, pp. 15-21.
- Flick, L. (1991). "Where concepts meet percepts: stimulating analogical thought in children". In *Science Education*, vol. 75, no. 2, pp. 215-230.
- Fuller, B. (1987). "What school factors raise achievement in the Third World?". In *Review of Educational Research*, vol. 57, no. 3, pp. 255-292.
- Gentner, D. (1986). Evidence for a structure-mapping theory of analogy and metaphor (Tech. Rep. No. UIUCDCS-R-86-1316). Urbana: University of Illinois, Department of Computer Science.
- George, J. M. (1988). "The role of native technology in science education in developing countries: a Caribbean perspective". In *School Science Review*, vol.69, no. 249, pp. 815-20.
- Goelenboth, F. (1987). "Village orientated topics in Papua New Guinea". In A. N. Rao, *Food, Agriculture and Education*. Oxford: Pergamon Press, pp. 127-129.
- Government of Meghalaya, (1990). *New Curriculum and Syllabi for Lower Primary schools*. Shillong: Meghalaya Board of School Education. pp. 1v + 292.
- Graham-Brown, S. (1991). *Education in the Developing World*. London: Longman.
- Gray, L., M. Fletcher, P. Foster, M. King and A. Warrender (1991). *Reducing the Cost of Technical and Vocational Education*. London: ODA.
- Gulliford, R and Widlake, P. (1975). *Teaching Materials for Disadvantaged Children*. Schools Council Curriculum Bulletin, no. 5. London: Evans/Methuen Educational.
- Gunstone, R. F. (1985). "Science education: secondary school programs". In T. Hussen and T. N. Postlethwaite (eds), *International Encyclopedia of Education: Research and Studies*. Oxford, England: Pergamon Press.

Haddad, W. D. (1986). Role and Educational Effects of Practical Activities in Science Education. Washington, DC: World Bank Education and Training Department.

Harbison, R. W. and Hanushek, E. A. (1992). Educational Performance of the Poor - Lessons from Rural Northeast Brazil. New York: Oxford University Press (Published for the World Bank).

Heyneman, S. and Loxley, W. A. (1983). "The effect of primary school quality on academic achievement across twenty-nine high- and low-income countries". In the American Journal of Sociology, vol. 88, no. 6, pp. 1162-1194.

Hough, J. R. (1991), Educational cost-Benefit analysis, London: ODA.

Husen, T. and Keeves, J. P. (1990). Issues in Science Education: Science Competence in a Social and Ecological Context. An International Symposium organised by the Royal Swedish Academy of Sciences. Oxford, Pergamon, 1990, 255pp. 599.07 Hus

Knamiller, G. W. (1984). "Linking school biology and community in developing countries". In the Journal of Biological Education, vol. 18, no. 1, pp. 77-81.

Krogh, S. (1990). The Integrated Early Childhood Curriculum. New York: McGraw-Hill Publishing Company.

Krugly-Smolksa, E. (1995). "Cultural influences in science education". In International Journal of Science Education, vol. 17, no. 1, pp. 45-58.

Lakoff, G. and Johnson, M. (1980). Metaphors we Live by. Chicago, IL: University of Chicago Press.

LeCompte, M. D. and Dworkin, A. G. (1991). Giving Up on School: Student Dropouts and Teacher Burnouts. California: Corwin Press, Inc. 371.1 Lec

Levin, H. and M. E. Lockheed (Eds) (1993), Schools in Developing Countries. London: Falmer Press.

Lewin, K. M. (1993) Education and Development: The Issues and the Evidence. London: ODA.

Lockheed, M. E. (1993) "The Condition of Primary Education in Developing Countries". in Levin & Lockheed, pp. 20-40.

Lockheed, M. E., Jamison, D. And Lau, L. (1980). "Farmer education and farm efficiency: a survey". In Economic Development and Cultural Change, vol. 29, pp. 36-76.

- Lockheed, M. E. and Verspoor, A. M. (1990). Improving Primary Education in Developing Countries: A Review of Policy Options. Washington, D. C., World Bank, 264pp.
- Mades, G. G. (ed.) (1990). Primary School Agriculture in Sub-Saharan Africa: Workshop Report and Resources Material on an African Workshop on Primary School Agriculture, Zimbabwe, Nov. 1990. Eschborn, Germany: DSE.
- National Farmers Union (1993) Farming and the Countryside as a Context for Learning. Wiltshire: NFU.
- Ogunniyi, M. B. (1995). "The development of science education in Botswana". In Science Education, vol. 79, no. 1, pp. 95-109.
- Pakistan, Ministry of Education, Bureau of Educational Planning and Management.
- "Village Primary Education in Pakistan: a review of "Primary Education in the Villages of Pakistan", 1976-77, Ministry of Education, Pakistan, 1977, 2v.". In Education in Asia, no.12, 1977, pp. 23-25.
- Peiris, K. (1976). "Integrated Approach to Curriculum Development in Primary Education in Sri Lanka". Experiments and Innovations in Education, no. 26. Paris: The Unesco Press.
- Riedmiller, S. and Mades, G. G. (1991). Primary School Agriculture in Sub-Saharan Africa: Policies and Practices. Eschborn, Germany: GTZ.
- Riedmiller, S. (1994). "Primary school agriculture - What can it realistically achieve?" In Entwicklung Landlicher Raum, no. 3, pp. 9-12.
- Ritchie, S. M. (1994). "Metaphor as a Tool for Constructivist Science Teaching". In International Journal of Science Education, vol. 16, no. 3, pp. 293-305.
- Ritchie, S. M. and Russell, B. (1991). "The construction and use of a metaphor for science teaching". In Research in Science Education, vol. 21, pp. 281-289.
- Rogers, A. and P. Taylor (in press) Participatory Curriculum Development. Rome: FAO.
- Seshadri, C. (1993) "Primary Education of the Disadvantaged Child". In Prakash, V. (Ed.) School Education in Rural India, Delhi: Mittal Publications, pp. 37-52.
- Seymour, J. M. (1974). "The Rural School as an Acculturating Institution: The Iban of Malaysia". In ..., vol 33, no. 3

Shepardson, D. P. and Pizzini, E. L. (1991). "Questioning levels of junior high school science textbooks and their implications for learning textual information". In Science Education, vol. 75, no. 6, pp. 673-682.

Solomon, J. (1986). "Children's explanations". In Oxford Review of Education, vol. 12, pp. 41-51.

Solomon, J. (1987). "Social influences on the construction of Pupils' understanding of science". In Studies in Science Education, vol. 14, pp. 63-82.

Stevens, P. (1976). "Problems of Learning and Teaching Science through a Foreign Language". In Studies in Science Education, vol. 3, pp. 55-68.

Turner, S. A. (1987). "Teaching about nutrition in primary and secondary schools". In A. N. Rao, Food, Agriculture and Education. Oxford: Pergamon Press, pp. 71-83.

Turner, S. A. and Ingle, R. B. (eds) (1985). "New developments in nutrition education". Nutrition Education Series, Issues 11. Paris: Unesco.

UNESCO (1971). "Agriculture and General Education". In Educational Studies and Documents, no. 2. Paris: UNESCO. Folio JBR

UNESCO (1983). Primary School Curriculum Planning and Selected Case Studies. Nutrition Education Studies Series, no. 4. Paris: Unesco.

Von Glasersfeld, E. (1987). "The Construction of Knowledge". Seaside, CA, The Systems Inquiry Series, Intersystems Publication.

Vygotsky, L. A. (1978). Mind in Society. Harvard University Press.

Walberg, H. J. (1991). "Improving school science in advanced and developing countries". In the Review of Educational Research, vol. 61, no. 1, pp. 25-69.

Watt, D. and Russell, T. (1990). Primary Science Processes and Concept Exploration Project (SPACE) - Research Reports (Sound). Liverpool University Press.

Wheatley, G. H. (1991). "Constructivist perspectives on science and mathematics learning". In Science Education, vol. 75, no. 1, pp. 9-21.

White, J. (1990) "For" Agriculture or "About" Agriculture? AERDD: Rural Extension Bulletin No. 29, pp. 17-20.

White, R. T. (1988). Learning Science. Oxford, UK: Basil Blackwell.

Yakubu, J. M. (1994). "Integration of Indigenous Thought and Practice with Science and Technology: A Case Study of Ghana". In International Journal of Science Education, vol. 16, no. 3, pp. 343-361.

Appendix A: Primary School Agriculture (PSA) - An Overview

Riedmiller (1994) notes that the development of PSA has been closely linked to political and ideological viewpoints. Marxist philosophy and its derivatives saw PSA as a means of initiating the population into the work ethic under the banner of "Education with Production", whilst in others Agriculture has been seen as a "relevant" subject area, pertinent to the development of the individual and ultimately the nation. Rousseau and Dewey placed considerable emphasis on the value of combining a balanced diet of intellectual and practical education. Colonial education systems also included PSA, frequently adapted to local conditions, since it was seen as a means of educating the "native" population for productive work. Needless to say, post-independence governments were keen to shed PSA as a relic of the colonial past.

In more recent times, increased unemployment, both urban and rural, encouraged some governments to reintroduce PSA as a means of "training for exit". Considerable financial investment has been made, therefore, into developing agriculture as part of the primary school curriculum. As a separate subject it forms a compulsory part of the school curriculum in a number of countries in Sub-Saharan Africa, including Botswana, Cote d'Ivoire, Kenya, Lesotho, Malawi, Rwanda, Swaziland and Tanzania.

Although PSA still remains alive and well in some countries, its resurrection has been swiftly followed by the acknowledgement that the inclusion of vocational subjects in the curricula of rural schools seems to have led to the creation of a dual education system; further disappointment has been created by the apparent failure of pilot PSA schemes to take off successfully on a large scale, and the movement by the World Bank away from the inclusion of vocational elements in basic education programmes.

Today, there is conflicting evidence about the popularity of PSA. In some instances it is said to be very popular amongst school students. Reasons given for this are that it is an "easy" subject and it provides an excuse to get out of the classroom. When it is well taught (which it frequently is not), it is experienced as a stimulating subject, rich in educational experiences and activities, with plenty of scope for project work. The "production" aspect of PSA is also cited as a plus factor, since pupils may provide a source of income and food for themselves, their teachers and even the local community.

In other cases, however, PSA is perceived to be deeply unpopular, being seen as "dirty", or as a form of punishment, and as a means by which pupils' labour is exploited. Some pupils and parents feel that it is unlikely to lead to paid employment, and link it with the poverty of subsistence, rural life which many young people seek to escape. Equally, as urban populations rise at the expense of rural-based populations, many urban-based young people do not see the relevance of an agricultural education.

Riedmiller and Mades (1991) have summarised well the benefits, and problems, associated with PSA. Tables 2.1 and 2.2 summarise the main points for and against the inclusion of PSA in the curriculum.

Table 2.1 Benefits of PSA

- i) PSA teaches a wide range of knowledge, attitudes and skills, useful in many other subject areas; it links theoretical concepts to practice and is part of a basic education; it enhances pupils' interest and motivation and it involves a discovery learning/problem solving approach which is transferable; it relates (if taught in a relevant way) to most rural pupils' experience and to a system which integrates human society with its physical environment;
- ii) PSA has a particularly important role to play in rural development, especially in developing countries; the teaching of Agriculture in a formal education system can also act as a form of community outreach; it can lead to an improvement in village life and community development, by providing teaching / extension / demonstration / research facilities which provide access and experience to local people as opposed to that provided by more centralised/regionalised institutions; it can also encourage communication and cooperation between the local community and the school (which are often lacking);
- iii) PSA may provide a short-term answer to serious development problems, such as poverty, increasing population, environmental degradation and increased social pressures;
- iv) Institutionally, the facilities allocated for PSA can be shared by many other school subject areas - e.g. maths, science, geography, home economics/food and nutrition and health studies, where they are included in the curriculum; equally the local environment can provide a rich source of learning opportunities for school pupils;
- v) Agricultural education makes a very valuable contribution to personal development of young people, encouraging them to develop responsibility, to be caring about others and to form relationships.
- vi) Agriculture as a subject area can be of direct relevance to other life skills areas (e.g. numeracy, literacy, health and hygiene, interpersonal relations (sexual/personal and family relationships) nutrition, management, both of self and of others, etc.); it can lead to the development of a range of transferable skills; in other words, it can contextualise learning by allowing learners to relate different aspects of education to their own personal experiences.

Table 2.2 Problems associated with PSA (based on Riedmiller, 1991)

- i) Agriculture is still perceived as a "non-academic" second-class subject, frequently not valued in the selection procedure for higher education. Employment in the agricultural sector and in rural areas is not considered prestigious largely because agricultural occupations tend to be poorly paid. Emphasising this point, many people are employed in the agricultural sector regardless of Agricultural education; knowledge and skills in literacy and numeracy may make a greater contribution to rural development than Agricultural education. High achievers in the academic system tend to come from urban rather than rural areas; where Agriculture is omitted from urban basic education programmes but provided for rural youth, the urban/rural divide may be reinforced; most school pupils seem to want to escape from the subsistence agriculture way of life.
- ii) It should be noted, too, that Agricultural education in many schools is of a poor standard compared with other subject areas, for the following reasons:
 - ◆ unsuitability, irrelevance and inflexibility of the curriculum;
 - ◆ an emphasis on content/theory rather than on practice/skills
 - ◆ practical work poorly, or wrongly, organised (punishment or forced labour);
 - ◆ poor teacher quality and the use of expatriate or urban-born teachers lacking knowledge of local agricultural and cultural conditions;
 - ◆ poor support within schools in comparison to other subject areas, particularly "pure" sciences;
 - ◆ poor support to schools implementing PSA from government;
 - ◆ little or no provision of in-service training and inadequate agriculture teacher training;
 - ◆ poor external linkages with the agricultural industry;
 - ◆ frequent lack of financial and material resources.
- iii) PSA is frequently not an examinable subject; this reduces motivation on the part of both pupils and teachers; where it is examinable, the emphasis is on memorised areas of knowledge, rather than on problem-solving and reasoning.

Riedmiller and Mades (1991) believe, for all the problems described above, that PSA can be implemented successfully, but that certain reforms are required to enable this. In particular, they would like to see:

- i) a more positive attitude by government policy makers towards PSA, both in terms of financial support to the development of PSA and through rethinking price controls on agricultural products which would be to the advantage of farmers and school production systems alike;
- ii) a more flexible, curriculum adopting both "linear" and "modular" agricultural elements (which could even be adapted for use in urban areas, thus satisfying the demands of the supporters of a unified curriculum)
- iii) compulsory examinations for PSA with an emphasis on assessment of problem-solving and reasoning skills,
- iv) adequate pre-service and in-service teacher training,
- v) well-designed teaching materials,
- vi) greater participation in decision-making about practical activities and use of products,
- vii) financial support for pedagogical and curricular improvements, rather than for tools, equipment, land, etc.
- viii) objectives with greater focus and realism about what can be achieved through PSA.

References

- Riedmiller, S. (1994) "Primary school agriculture - What can it realistically achieve?" In *Entwicklung Landlicher Raum*, no. 3, pp. 9-12.
- Riedmiller, S. and Mades, G.G. (1991) *Primary School Agriculture in Sub-Saharan Africa: Policies and Practices*. Eschborn, Germany: GTZ.

Appendix B: Case Study: The Primary Processes and Concept Exploration Project (SPACE)

Some research has been carried out in the United Kingdom which, although set in an English context, is pertinent to the discussion here, since it is a project which has attempted to examine childrens' concepts and experiences and build them into the curriculum in a specific way. This approach could have real value in order to explore the knowledge of children in any particular context.

Watt and Russell (1990) describe a classroom-based research project based on the view that children develop their ideas through the experiences they undergo. It has two main aims: firstly, to establish (through an elicitation phase) what specific ideas children have developed and what experience might have led children to hold these views, and secondly, to see whether, within a normal classroom environment, it is possible to encourage a change in the ideas in a direction which will help children to develop a more "scientific" understanding of the topic (the intervention phase). In order to achieve this, there has been a development of techniques which advance both classroom practice and research, aimed at helping researchers understand children's thinking better. Each of the five stages of the project was regarded as developmental.

There were three aims in the Pilot phase:

- 1) to trial the techniques used to establish children's ideas;
- 2) to establish the range of ideas held by the primary school children;
- 3) to familiarise the teachers with the classroom techniques being employed by the project.

In the Exploration phase, children were engaged with activities set up in the classroom for them to use, without any direct teaching. The activities were designed to ensure that a range of fairly common experiences (drawn in most cases from everyday life experiences) was uniformly accessible to all children to provide a focus for their thoughts. The purpose was to help children articulate existing ideas, not provide them with novel experiences. In this phase, teachers were encouraged to collect the children's ideas using informal classroom techniques (log-books, structured writing/drawing, completing a picture, individual discussion using open-ended questions). In the Elicitation phase, the project team collected structured data through interviews and work with groups to establish the frequencies of the ideas held, and the experiences from which these derived. During the Intervention, teachers used this information as a starting point for classroom activities, or interventions, which were intended to lead to children extending their ideas.

The Intervention strategy was to:

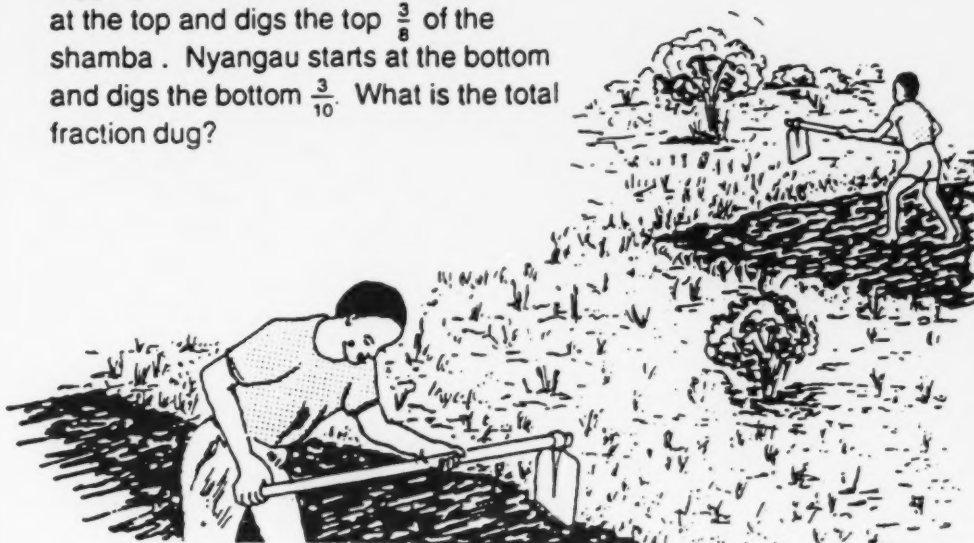
- 1) encourage children to test their ideas (develop thinking with greater scientific competence),
- 2) encourage children to develop more scientific definitions for particular key words (define words in a relevant context),
- 3) encourage children to generalise from one specific context to

others through discussion with other children as well,
4) find ways to make imperceptible changes perceptible (e.g. concept of evaporation through the use of agricultural practices of watering, etc) 5) test the right idea alongside the children's own ideas.

The Post-Intervention Elicitation phase enabled researchers to come nearer to establishing what conceptual development it is possible to encourage within the classroom and the most effective. An examination of the changes within individual children showed that a large number of children had developed their ideas in a way which could help them to develop more scientific thinking. While many children's ideas remained unchanged there were very few children whose ideas were less explanatory than prior to the Intervention. Teachers also developed skills in non-directive classroom techniques and some became more analytical in their approach to teaching. They also felt more confident to incorporate new teaching techniques. This methodology, adapted to local circumstances, could provide an interesting means of exploring how to use locally relevant themes as contextualising subjects.

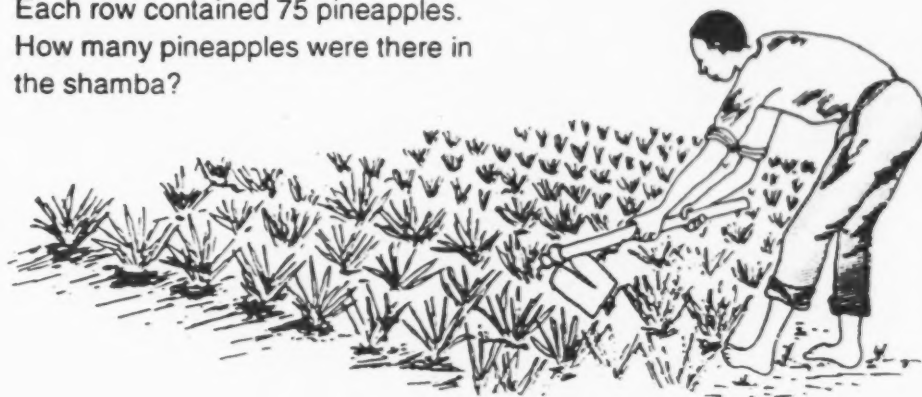
Appendix C: Examples of text-book material for language, mathematics and science elements in the curriculum which draw on agricultural practice and experience.

4. Ondimu and Nyangau are digging a shamba. Ondimu starts at the top and digs the top $\frac{3}{8}$ of the shamba. Nyangau starts at the bottom and digs the bottom $\frac{3}{10}$. What is the total fraction dug?



5. Omolo dug $\frac{1}{4}$ of his shamba on Monday and $\frac{3}{5}$ on Tuesday. What total fraction of the shamba did he dig in the two days?

5. Otugah planted 139 rows of pineapples in his shamba. Each row contained 75 pineapples. How many pineapples were there in the shamba?



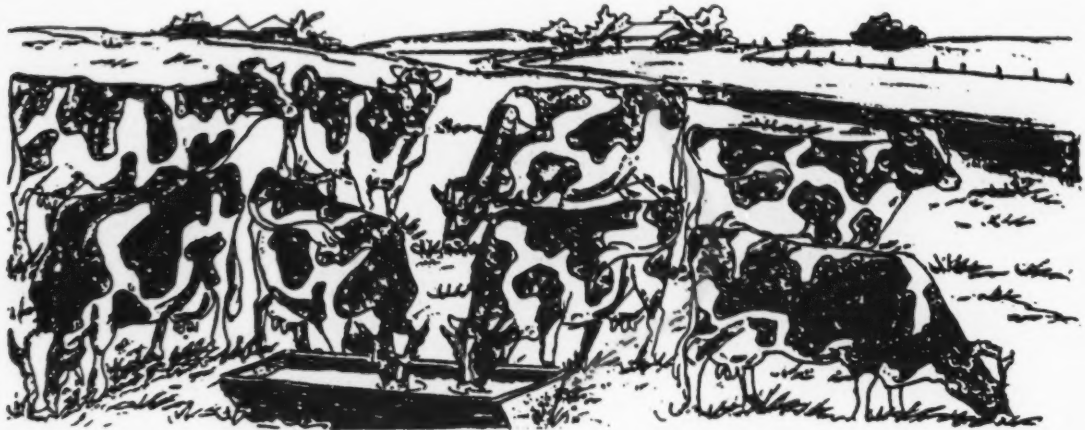
E Talk maths: A dialogue

A: Look at Mr. Kombo's cows.

B: In 1988 he had five cows. Today he has eight cows.

A: By how many have his cows increased?

B: They have increased by three cows.



	1988	Today
Cows	(5)	(8)
Hens	12	20
Sheep	25	36
Goats	10	16
Pigs	8	12

F Write a letter like this to a friend.

PO Box 347,
Isiolo,
12/2/88

Dear Meja,

I have done two important jobs today.

I have milked the cows and I have planted the onions. Please write me a letter about your day.

With best wishes,

Tom

These words will help you:

clean, water, hoe, mend, iron, cook, wash, dust, herd,
weed, pick, brush

Unit 15 Tree planting day

A Learn these words

1



pegs

2



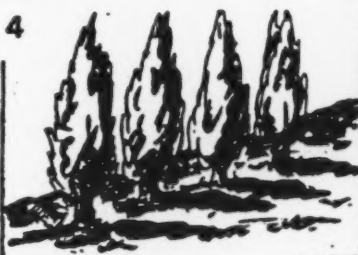
a tree nursery

3



seedlings

4



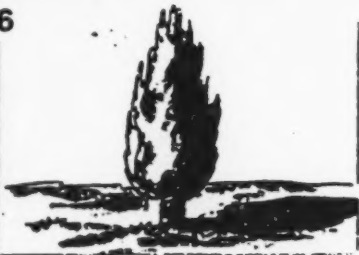
a row of trees

5



a windbreak

6



light

shade

B Learn these sentences

Wood is used for making paper.

Wood Cotton Leather Milk Animal waste	is used for making	shoes. butter. furniture. manure. cloth.
--	---------------------------	---

C Pronunciation practice

Read these pairs of words aloud

fill feel hili heal mill meal pill peal

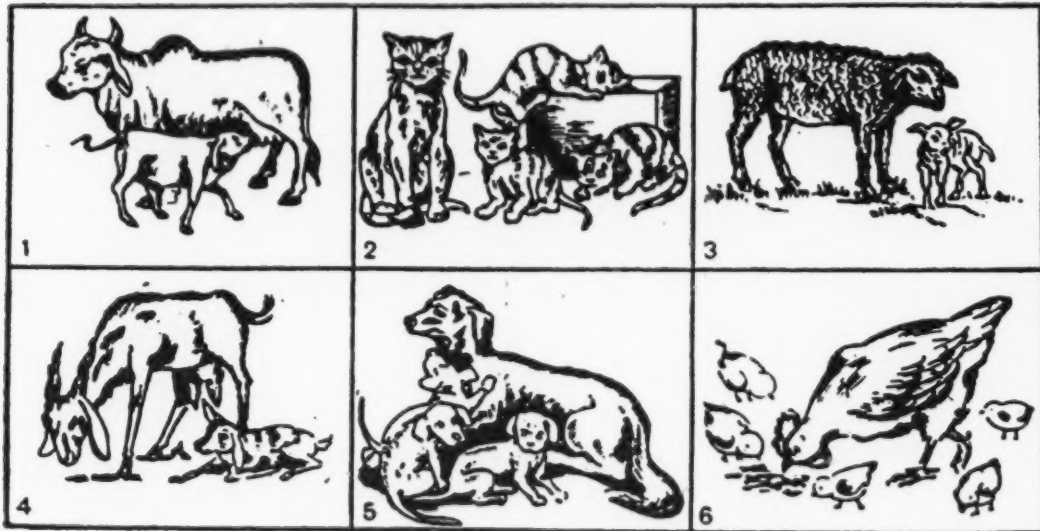
D Reading: Tree planting day

The pupils of Mtitoni Primary school woke up earlier than usual. It was National Tree Planting day, and they were going to plant a lot of trees.

CLASS WORK 8

A VISIT TO A FARM

Yesterday Ashok and Anita went to their uncle's farm. There they saw a cow, a cat, a sheep, a goat, a dog and a hen. They also saw a lamb, a kid, a calf, some chicks, some kittens and some puppies.



Now complete each sentence by writing the correct name in each blank space. You can choose your words from the box.

1. Young cows are called *calves*.
2. Young dogs are called
3. Young cats are called
4. are young goats.
5. are young sheep.
6. are young hens.
7. The babies of cats are called
8. The babies of cows are called

puppies
kids

calves
lambs

kittens
chicks

3. I have bought a cow for Rs. 379, a horse for Rs. 975 and a watch for Rs. 135. What did I spend altogether?
4. A man bought a cycle for Rs. 219, a piece of cloth for Rs. 127 and a sofa set for Rs. 425. How much did he spend in all?
5. A man bought a radio set for Rs. 560, a steel Almirah for Rs. 639 and an electric fan for Rs. 168. What did he spend in all?
6. A farmer bought a pair of bullocks for Rs. 975, a cow for Rs. 239 and a buffalo for Rs. 478. How much did he spend in all?
7. A tradesman saved Rs. 892 in one year, Rs. 489 in the second year and Rs. 687 in the third year. How much did he save in 3 years?
8. A man plucked 432 mangoes from one tree, 902 mangoes from the second tree and 245 mangoes from third tree. How many mangoes did he pluck in all?
9. A shephard has 400 sheep, 325 goats and 129 cows. How many cattles had he in all?
10. Rama bought a saree for Rs. 97, a shawl for Rs. 245 and a radio set for Rs. 425. How much did he spend in all?
11. A fruit-seller has three baskets having 156 apples, 250 apples and 320 apples respectively. Find the total number of apples.

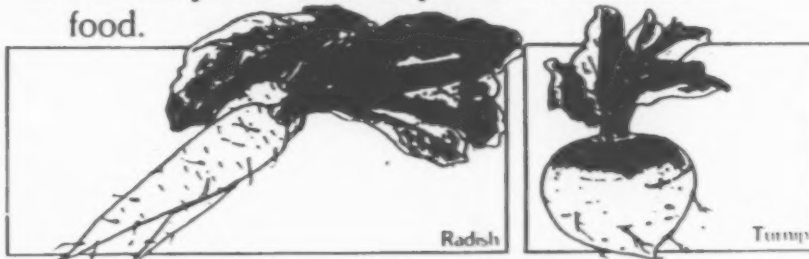
Source: New School Arithmetic. Sharma, T. C. 1990.
New Delhi: Children's Book House.

Lesson 5 Plants are Useful

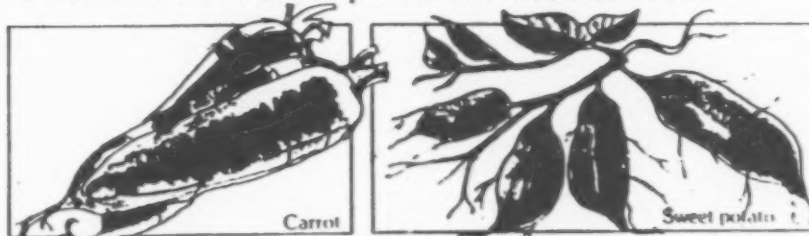
Plants are useful in many ways.

A. PLANTS GIVE US FOOD.

1. All the parts of some plants are used as a food.



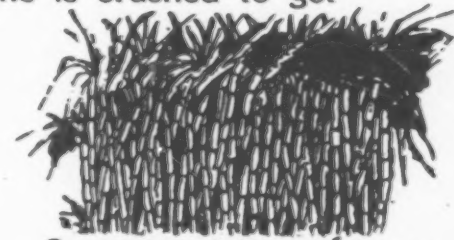
2. Roots from some plants are used as food.



3. Stem from some plants is used as food.

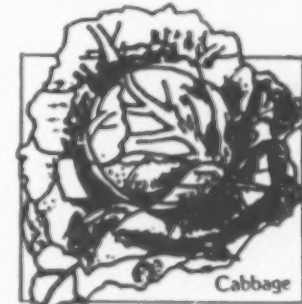


Stem of sugarcane is crushed to get sugarcane juice.

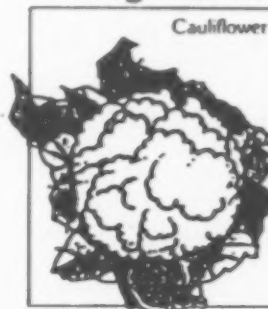


Sugarcane juice is taken as a drink. It is also used to make sugar from it.

4. Leaves from some plants are used as vegetables.



5. Flowers from some plants are used as vegetables.



**Appendix D: Examples of Worksheet Material generated during
the UK Primary School Project described in
Section Four.**

TITHE BARN WORK

1. Copy and fill in the missing words (see below).
2. Read through the completed piece of writing. Write down in your 'Think Book' why you think Manor Farm has a Tithe Barn.
3. Discuss with your partner your reasons and their reasons. (You can then see if you can find any reference in the farm books or encyclopaedias or even the dictionary). Do these sound similar to your reasons?
4. Write up (on the end of your previous missing word sheet) an explanation of why you think Manor Farm has a Tithe Barn.
5. Find a picture of it on the Library walls and superimpose a drawing over your written work.

-- ooOoo --

TITHE BARN (TYTHE)

A Tithe was originally a form of ----- . It consisted of one ----- of a man's property or ----- . It was connected with the "first fruits" what we now call ----- . It was also connected with taxes. In Bible times, the king could take a ----- from the cornfields, -----, and flocks. (-----). This can be found in the ----- in 1. Samuel chapter 8, verses 15,17. Later on in the Bible, in Deuteronomy, the word 'tithe' had come to be ----- regularly for religious ----- . The tithe system became a way of supporting the priests or ----- . Tithes were taken all over the world and still are but are mainly now ----- given. Before ----- tithes were one tenth of what was produced. H- -, c- -, w- - - or living things c- - - -, l- - -, f- - -. They were only ----- once each year. It was not until 1936 that ----- passed an act to end tithing.

.....

tribute,	Thanksgiving,	Harvest,	used,
tenth,	tithe,	animals,	payments
produce,	vineyards,	Bible,	Minister
of	1836	Religion	freely,
payable,	parliament.		

Imperial Measurements

12 inches = 1 foot
3 feet = 1 yard
1760 yards = 1 mile

Abbreviations

inches = ins.
feet/foot = ft.
yard = yd.
mile = m.

Metric Measurements

10 millimetres = 1 centimetre
100 centimetres = 1 metre
1000 metres = 1 kilometre

millimetres = mm.
centimetres = cm.
metre = m.
kilometre = km.

Comparison

$\frac{2\frac{1}{2} \text{ cm.}}{1 \text{ inch}}$

Approximately.

FLOOR OF STANTON ST. QUINTIN DOVECOTE IN
IMPERIAL MEASUREMENT - NEWSPAPER 1932.

During medieval times farms were planned and built in a courtyard style. This gave security, protection from the weather and a nice working unit. Most of these farms had a house at the North Side, a barn at the south and haybarn on the west side. The cattle sheds and stables would be on the east side. When Sir William Sharington bought Lacock Abbey in 1540 he rebuilt the stableyard in courtyard style.

In South Wiltshire Thomas Davis refers to yards. On most farms a strawyard can be found for the cattle with buildings around. Old books mention 'Court' and 'Barton' which are other names for yards.

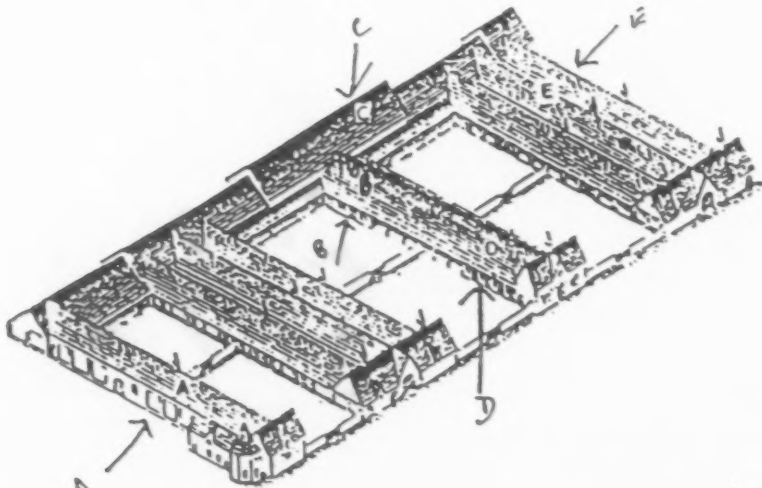
Later, in the 18th and 19th Century 'Model Farms' were built. Only wealthy people could have these built. All the farm buildings were built at the same time but because some buildings were not constructed as well as say the farm house there are very few still complete today. Belle Cow Farm, Wingfield, Nr. Trowbridge., New Farm, Lacock, Nr Chippenham and Trimnells Farm, Colerne, Nr Chippenham are three that were built in the 18th - 19th Century. They were all built by large estate owners. The farm in Wingfield was built early 18th Century and so was the Lacock farm but the Trimnells was built in 1874.

In the second half of the 19th Century (1860's onwards) another farm layout was built. This was called the open and covered yard. Below are details of one such farm.

A quote from a book written about Architecture by Joseph Gwilt in 1867 states in the farm building section: "the seemingly repulsive nature of the subject.....may be made very picturesque?"

The title of his book was Encyclopaedia of Architecture.

Netherhampton Farm, Netherhampton



Netherhampton farm, Netherhampton, drawn from the Southeast. It was built in the early 1860s for the Earl of Pembroke and Montgomery of Willton House and served a farm of 590 acres, of which 338 were arable. 'A' marks the stable for 14 working horses, 'B' boxes for 12 fattening cattle, 'C' the barn, 'D' the piggery, and 'E' the covered yards and cowhouse for the dairy herd of 50 head. The dairy was South of the farmstead. The open yards were used for store and growing cattle. Provision was made for steam or horse power to drive fixed machinery. (From 'The Farm Homesteads of England' by J. Bailey Denton 1863)